

1992

PERFORMANCE REPORT

TRACE ORGANICS SECTION

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ISTRY OF THE ENVIRONMENT

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MOE/LABORATORY SERVICES BRANCH

TRACE ORGANICS SECTION

PERFORMANCE REPORT 1992

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MARCH 1993

ENVIRONMENT

TD/360/TT2/P47/¹⁹⁰⁶1992

#151

INTRODUCTION

The Trace Organics Section is part of the Laboratory Services Branch (LSB) operating within the Environmental Services and Standards Division of The Ministry of the Environment. The Section is comprised of three units: Air Monitoring, Biota and Sediment and Wastewater. The section provides services to the Ministry of the Environment programs and not directly to the public of Ontario.

The areas of responsibility include the analysis of a wide array of matrixes, ranging from fish to water to air and hazardous wastes. The samples are analyzed for a variety of substances that include: Polychlorinated Biphenyls (PCBs), Polynuclear Aromatic Hydrocarbons (PAHS), Pesticides, Chlorinated Industrial Organics and Volatiles.

This report provides an outline of the section's quality control (QC) programs for organics, along with a summary of the resulting 1992 performance data for each workstation. The Trace Organics Section maintains a high standard of analytical performance through its quality assurance program and QC is an integral part of the process.

ACKNOWLEDGEMENTS

This report is dedicated to the technicians, scientist and supervisors of the Trace Organics Section.

We would like to thank the technical staff for accumulating and providing us the with the quality control data so that this report could be issued.

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1.0 PERFORMANCE REPORT FORMAT

The performance report is divided into two parts. Part One outlines the format of this report. Part Two consists of the quality control programs and performance summaries of the analytes analyzed.

A performance report is generated for each workstation conducted in the Trace Organics Section with the exception of those parameters where no data or less than ten pieces of data existed for 1992. The performance report is set up by units and their respective workstations. Each performance report consists of three parts: the analytical procedure summary, the performance data summary sheet and the quality control graphics page. Detailed information concerning each of the three parts is outlined next.

1.1 ANALYTICAL PROCEDURE SUMMARY

Identification:

Method Code:	LIS code for the analytical procedure.
Unit:	Unit in which the analysis is performed.
Sample Type:	Matrix - water, effluent, air, fish and vegetation.
Supervisor:	Name of the supervisor responsible for the designated laboratory.
Principle of Method:	Type of analysis performed, and instrumentation used.
Parameters Measured:	Compound analysed.
Reporting Results:	Units of measurement in which the results are reported.
Method Control:	The calibration, drift, recovery that are used when applicable to ensure that the system is operating properly.
Remarks:	Explanatory notes which may aid the data user in interpreting results and information.

1.2 PERFORMANCE DATA SUMMARY SHEET

No. Observations:	The number of data points collected.
Instrumentation:	Instrument used in the analysis of a particular compound.
Parameter:	Compounds analyzed.

Exp.Concentration: Known amount of analyte in solution.

Average % Recovery: Mean value in percent recovered from data collected for a particular analyte.

Standard Deviation: Sum of observations squared minus the sum of the squared observations divided by the number of observations minus one.

Coefficient Variance: The Standard Deviation divided by the Average times 100.

1.3 GRAPHICS PAGE

Title: The name of the test parameter

Calibration Control: Calibration control standards average and range are plotted on a horizontal scale for the period of data collected. The vertical scale consists of the control limits expressed on either side of the expected value.

AIR MONITORING UNIT

Workstation	Method Title	Catalogue No.

PAAPAH	The Determination of Polynuclear Aromatic Hydrocarbons in High Vol Filters by GC/MSD.	E3124A
SXT	The Determination of Organic Solvent Extractable Matter in Liquid by Liquid-Liquid Extraction.	E3201A
PAAPCB	The Determination of Polychlorinated Biphenyls in Air By GC-ECD.	E3125A
DESORB	The Determination of Volatile Organics in Air by Metrex Desorber, GC-FID.	E3131A

ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: PAAPAH E3124A

SAMPLE TYPE: AIR

UNIT: AIR MONITORING

SUPERVISOR: DR. B. FOSTER

PRINCIPLE OF METHOD:

The release of Polynuclear Aromatic Hydrocarbons (PAH'S) into the environment is occurring as the result of the incomplete combustion process of carbonaceous material under conditions of insufficient amounts of oxygen and/or low combustion temperatures.

The monitoring of polyaromatic hydrocarbons (PAH's) in ambient air involves the use of a modified Hi-Vol air sampler to collect a sample on a combination of a Teflon-coated glass fiber filter and a AD-2 resin cartridge. The compounds are soxhlet extracted from the filter and resin and subjected to Gas Chromatography analysis. The sample extracts are analyzed simultaneously on two capillary columns of different polarity, each interfaced to a flame ionization detector (FID). The compounds are identified by their retention times and quantitated by measurement of peak area relative to the calibration standards.

PARAMETERS MEASURED:

Polyaromatic Hydrocarbon Compounds

benzo (ghi)perylene	BNGHIP
naphthalene	PNNAPH
acenaphthene	PNACNE
acenaphthylene	PNFLUO
fluorene	PANCNE
phenanthrene	PNPHEN
anthracene	PNANTH
fluoranthene	PNFLAN
benzo (a) anthracene	PNBAA
chysene	PNCHRY
benzo (k) fluoranthene	PNBKF
benzo (b) fluoranthene	PNBBF
benzo (a) pyrene	PNBAF
indo (1,2,3-cd) pyrene	PNINP
1-methylnaphthalene	PN1MNA
1-methylphenanthrene	PN1MPH
2-chloronaphthalene	PN2ONA
2-methyanthracene	PN2MAN
2-methylnaphthalene	PN2MNA
3-methylchloranthrene	PN3MCH
9-methylphenanthrene	PN9MPH
benzo (a) fluorene	PNBAF
benzo (b) fluorene	PNBBFA

benzo (e) pyrene
biphenyl
coronene
dibenzo (a,c) anthracene
9,10-dimethylanthracene
7,12-dimethy (a) anthracene
m-terphenyl
o-terphenyl
perylene
picene
p-terphenyl
pyrene
tetralin
triphenylene

PNBEP
PNBIPH
PNCORO
PNDACA
PNDMAN
PNDMBA
PNMTER
PNOTER
PNPERY
PNPICE
PNPTER
PNPYRE
PNTETN
PNTRIP

REPORTING RESULTS:

Results are reported in ng/m3.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC samples.

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Co-elution problems exist with certain compounds. Any identification with dual column chromatography may be regarded as "tentative". If confirmation or identification is required a second corroboration with alternative methods such as mass spectrometry is required. PAH's are susceptible to chemical and physical transformations such as oxidation and light reactive conformational shifts. Therefore stained amber glassware is utilized to prevent light reactions.

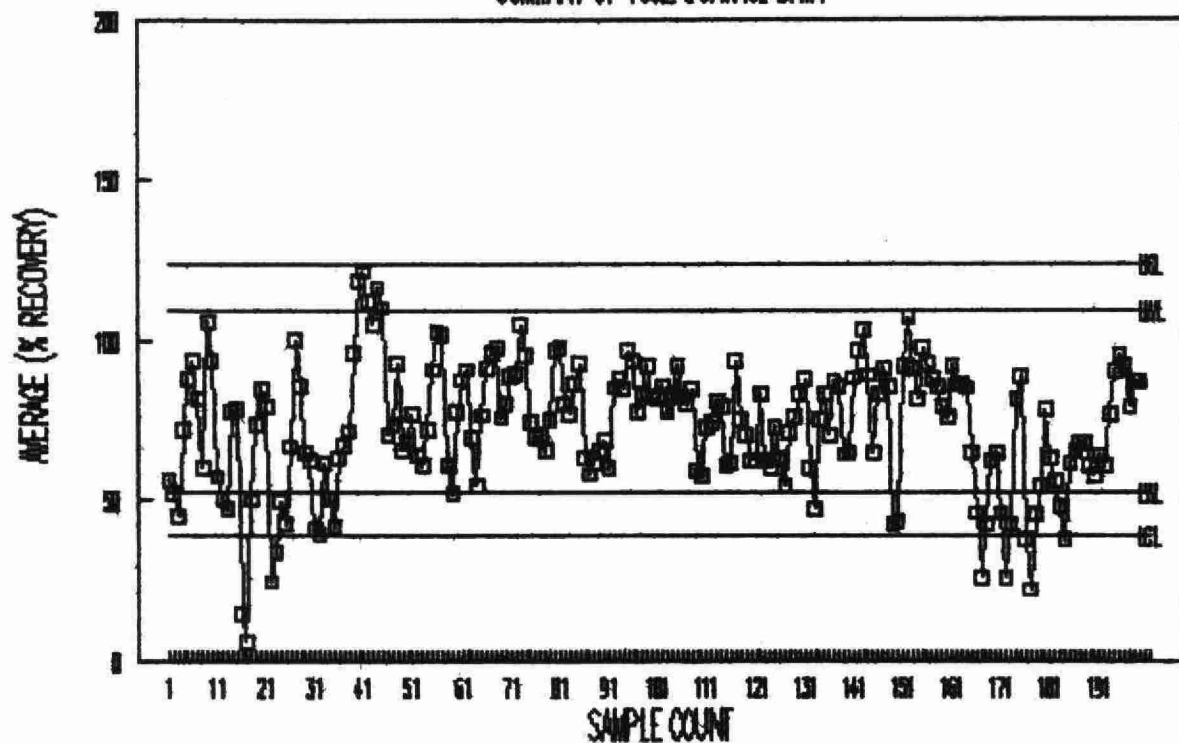
UNIT: AIR MONITORING MATRIX: AIR
 WORKSTATION: PAHAIR INSTRUMENT: MSD
 TIME PERIOD: JAN.-DEC.1992 NO. OBSERVATIONS: 300

YEARLY CALCULATION

PARAMETER COMPOUND		AVG. SPK. % REC.		STD. DEV. % REC.		% C.V.
1. D10-ACENADIO	:	81.35	:	26.54	:	37.6
2. D10-ANTHRD	:	74.58	:	25.48	:	34.2
3. D12-PYREND	:	98.04	:	23.13	:	23.6
4. D12-CHRYSD	:	101.79	:	23.95	:	23.5
5. D12-BENZO	:	77.81	:	31.60	:	40.6

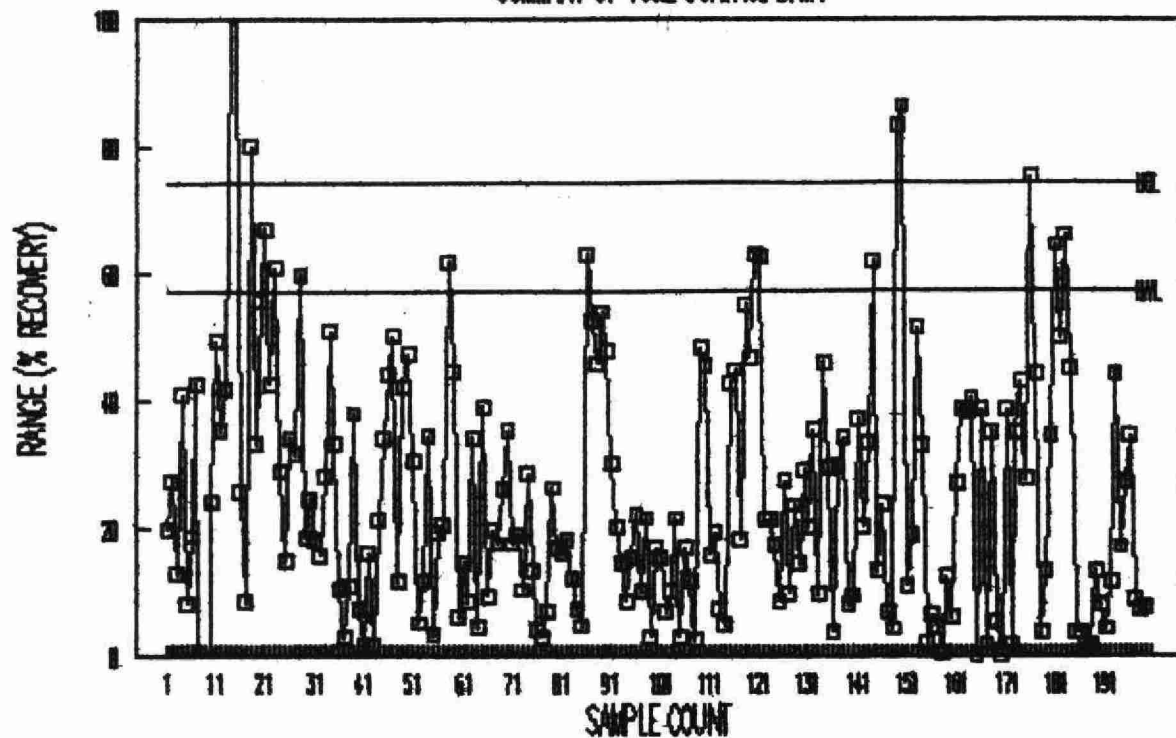
PAHAIR/PAHAPS:D10-ACENAPHTHENE

SUMMARY OF 1992 CONTROL DATA



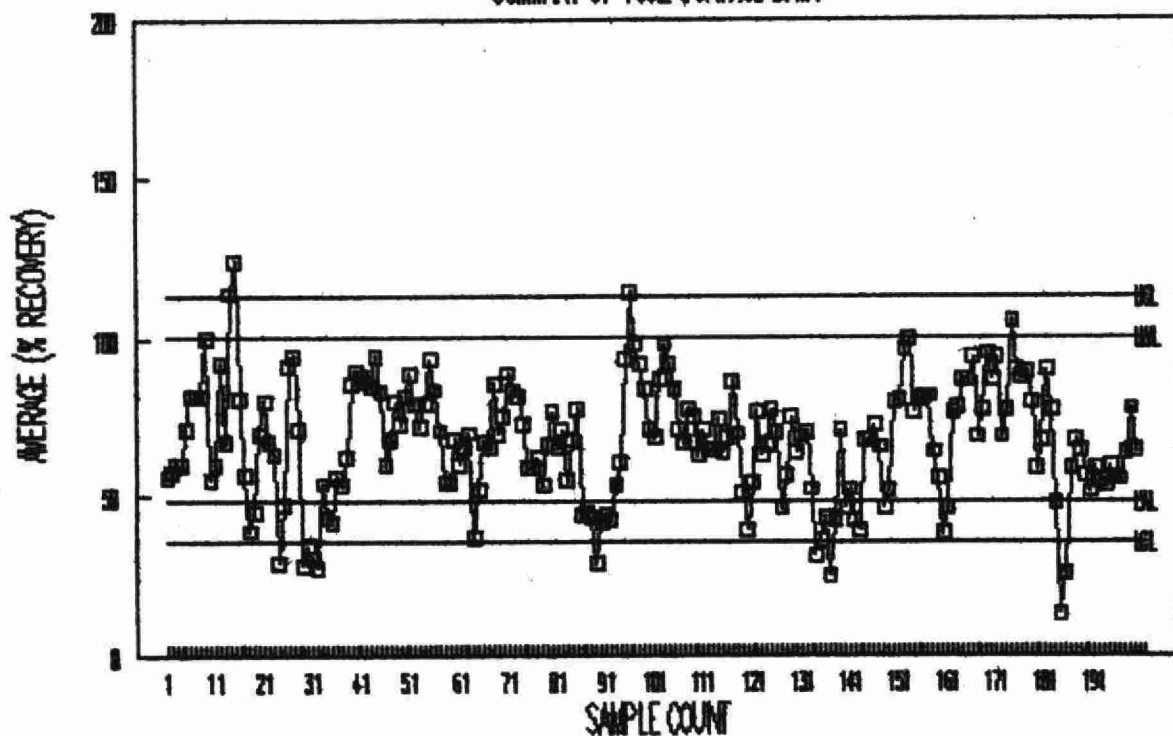
PAHAIR/PAHAPS:D10-ACENAPHTHENE

SUMMARY OF 1992 CONTROL DATA



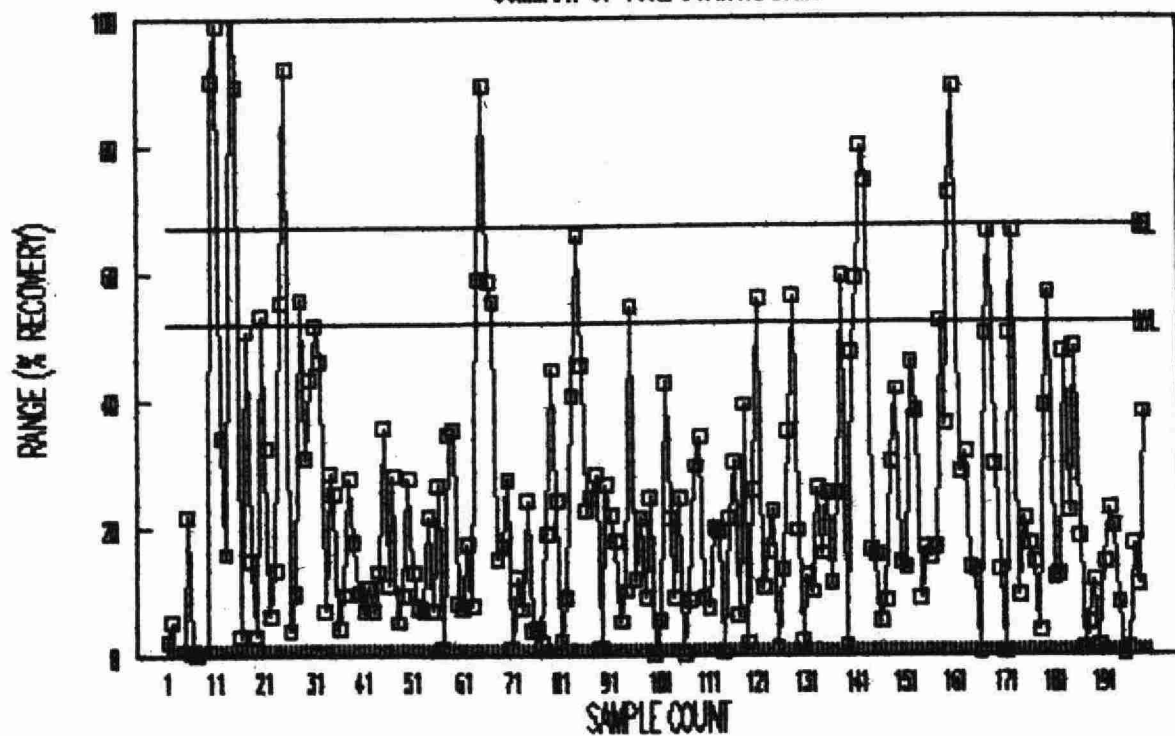
PAHAIR/PAHAPS:D10-ANTHRACENE

SUMMARY OF 1992 CONTROL DATA



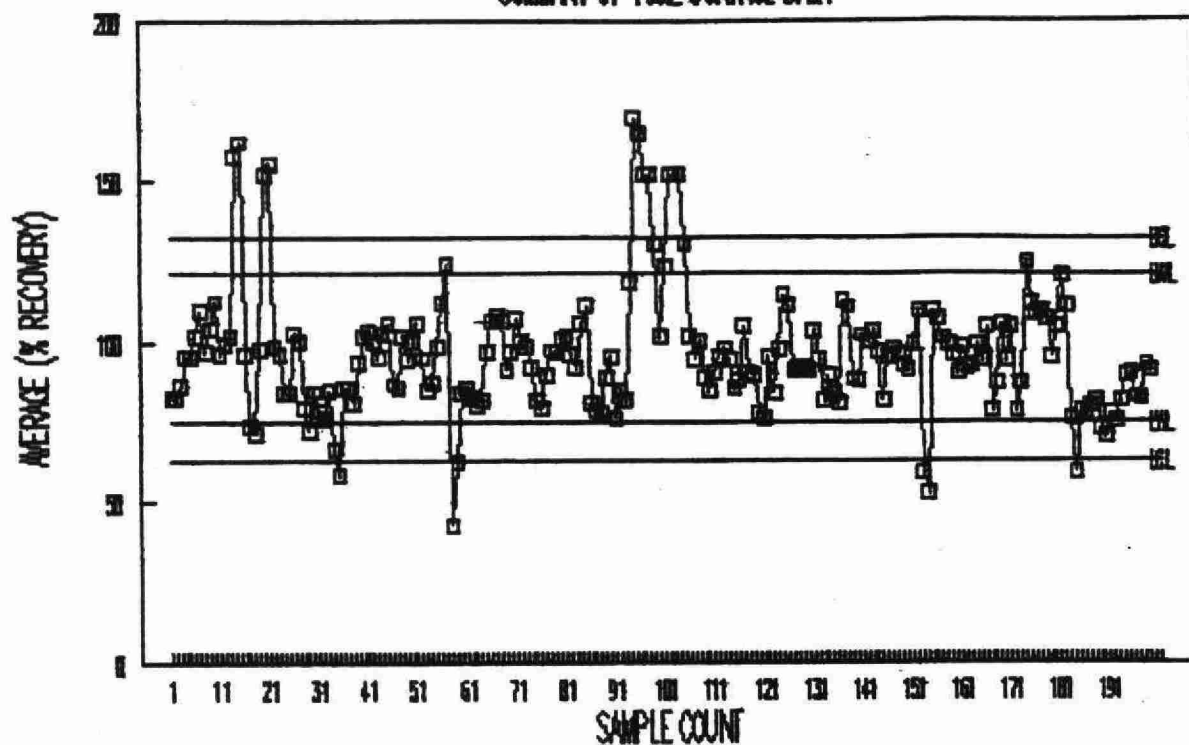
PAHAIR/PAHAPS:D10-ANTHRACENE

SUMMARY OF 1992 CONTROL DATA



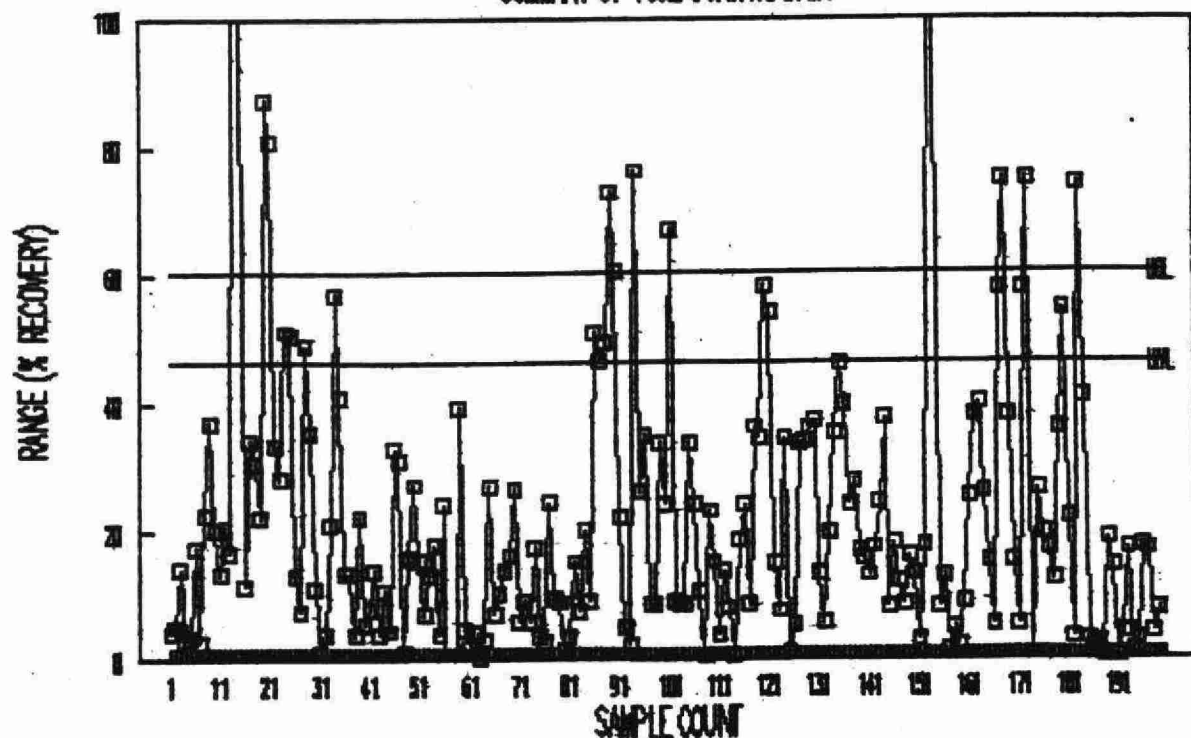
PAHAIR/PAHAPS:D10-PYRENE

SUMMARY OF 1992 CONTROL DATA



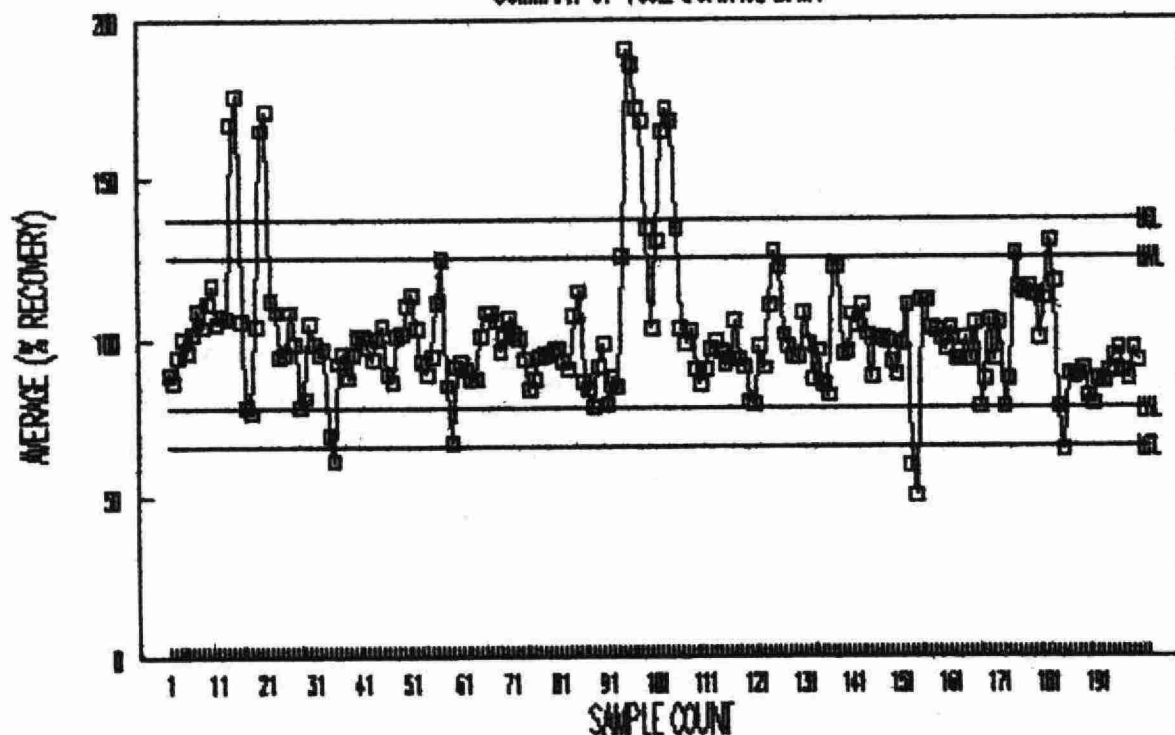
PAHAIR/PAHAPS:D10-PYRENE

SUMMARY OF 1992 CONTROL DATA



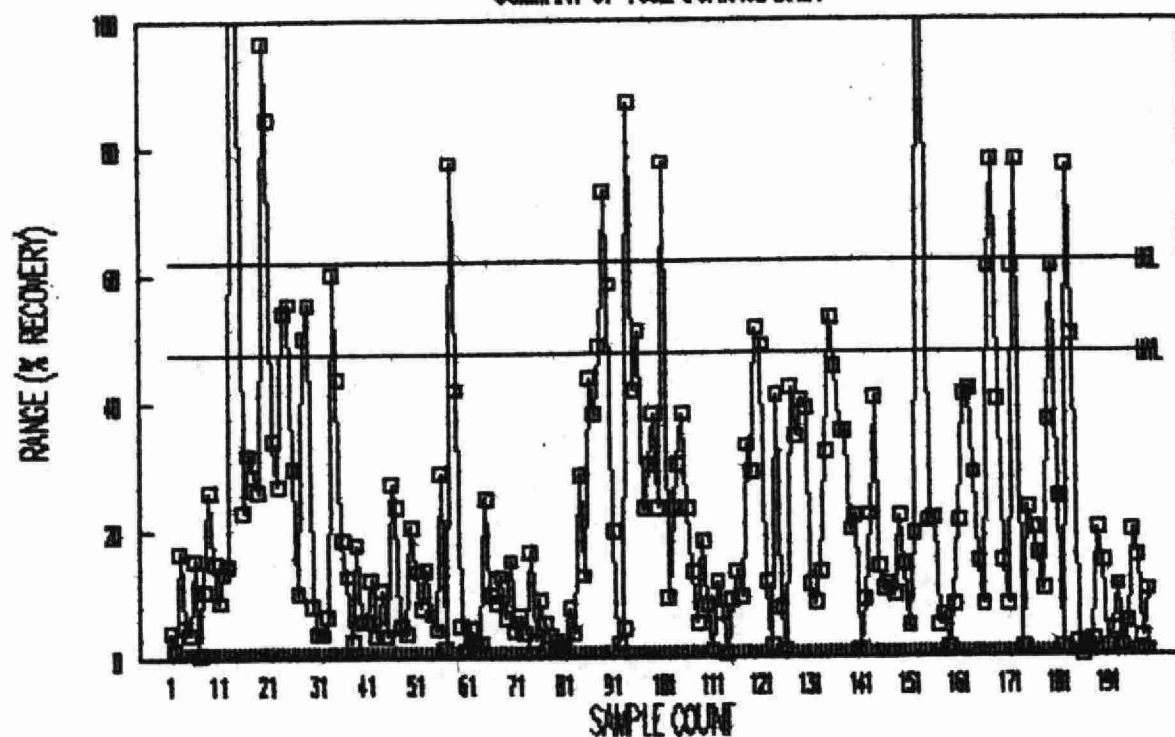
PAHAIR/PAHAPS:D12-CHRYSENE

SUMMARY OF 1992 CONTROL DATA



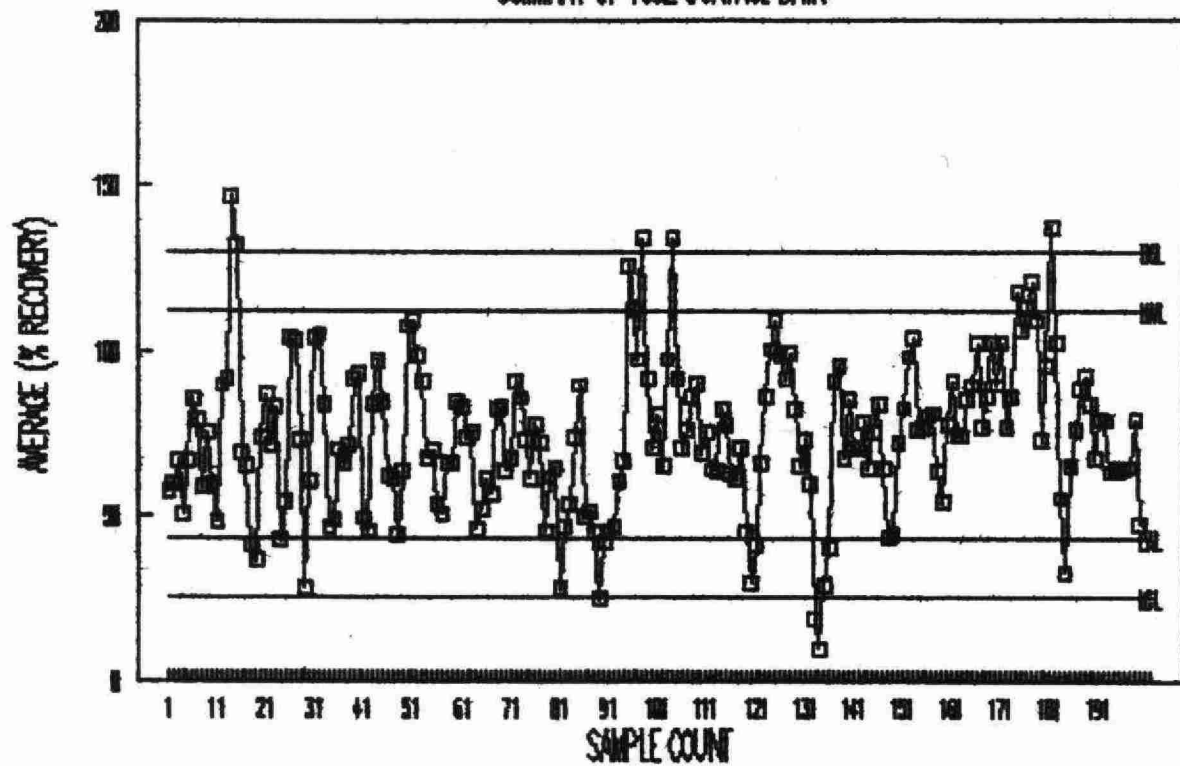
PAHAIR/PAHAPS:D12-CHRYSENE

SUMMARY OF 1992 CONTROL DATA



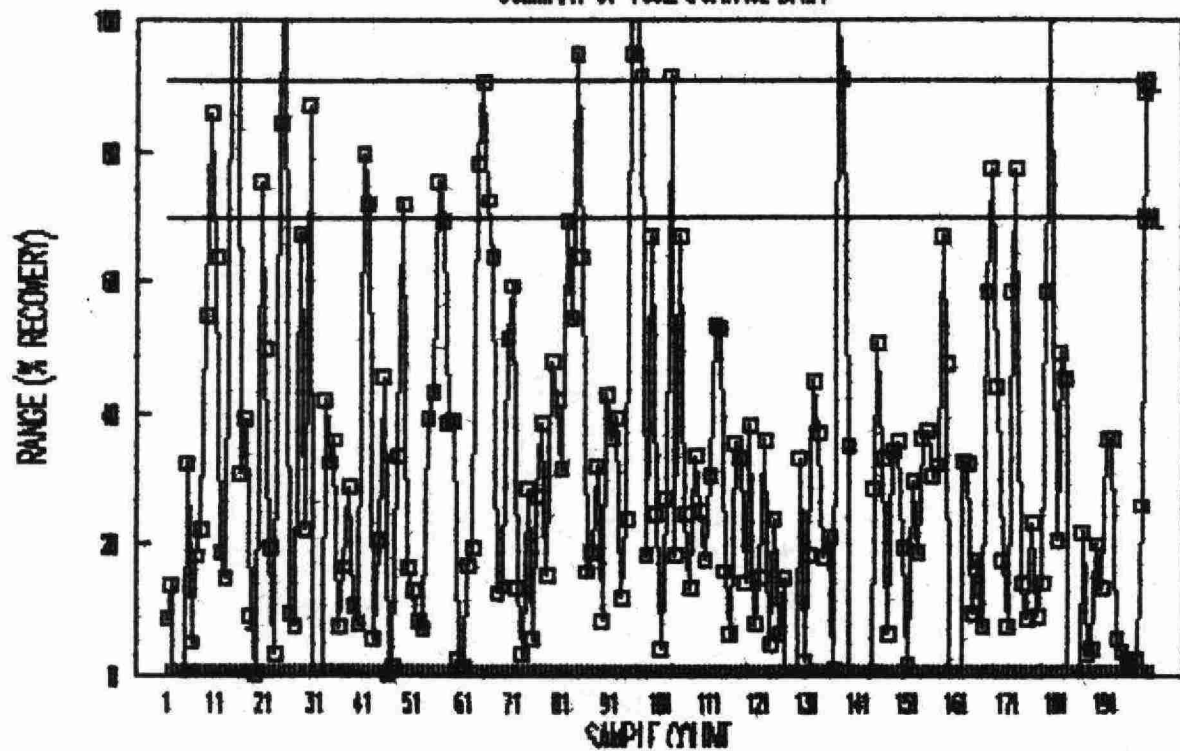
PAHAIR/PAHAPS:D12-BENZO[A]PYRENE

SUMMARY OF 1992 CONTROL DATA



PAHAIR/PAHAPS:D12-BENZO[A]PYRENE

SUMMARY OF 1992 CONTROL DATA



ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: SXTID

SAMPLE TYPE: LIQUID

UNIT: AIR MONITORING

SUPERVISOR: DR. B. FOSTER

PRINCIPLE OF METHOD:

The three major groups of solvent extractables are: non-volatile petroleum hydrocarbons, cooking oils and soaps/detergents. Liquid samples are extracted with organic solvent to remove any organic constituents. The approach used offers both qualitative and quantitative information on the organic compounds extracted.

PARAMETERS MEASURED:

Solvent extractable organics.

REPORTING RESULTS:

Results are reported in mg/L.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance.

PARAMETERS:

All target parameters are controlled via the QC samples.

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Losses can occur from the formation of emulsions which result in the loss of extractable matter in the interphase, and from evaporation of the semivolatiles during solvent removal. The use of dichloromethane limits analysis to organics extractable by dichloromethane.

UNIT: ATMOSPHERIC
WORKSTATION: SXTID
TIME PERIOD: JAN.-DEC. 1992

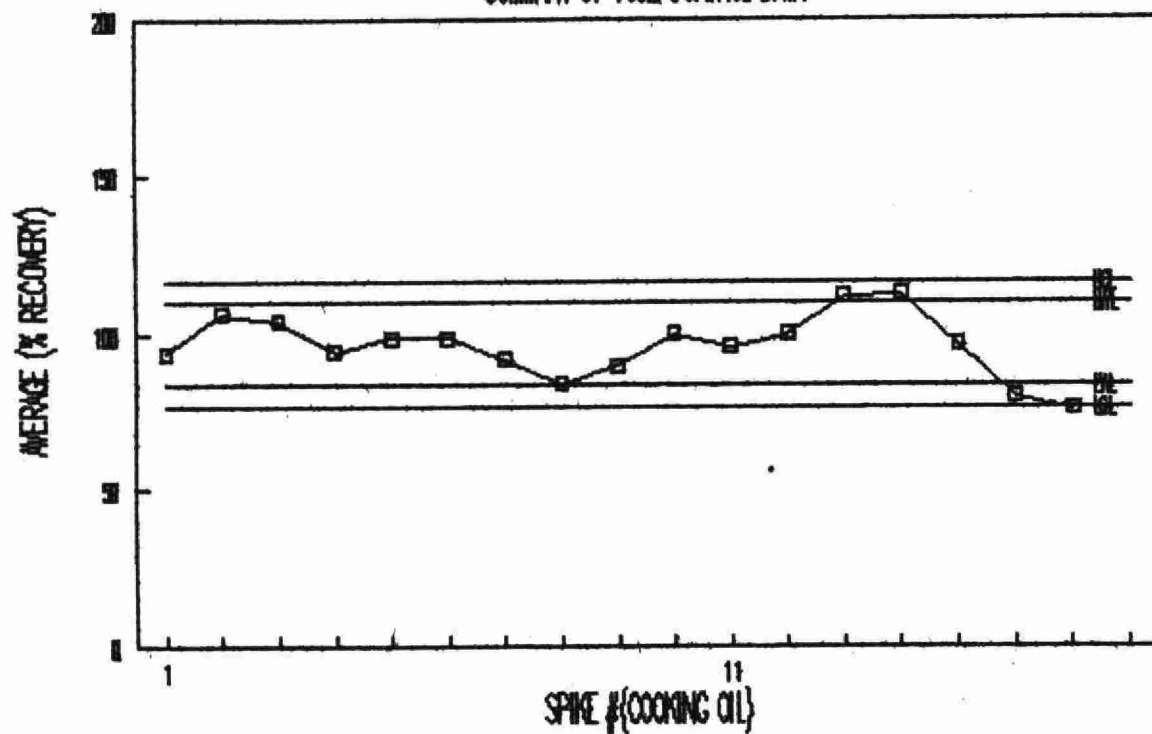
MATRIX: OIL/GREASE
INSTRUMENT: GRAVAMETRIC
NO. OBSERVATIONS: 17

YEARLY CALCULATION

PARAMETER COMPOUND	SPIKE PPM	AVG. SPK. % REC.	STD. DEV. %REC.	% C.V.
1. C-IOLA	: 5	: 97	: 11	: 11
2. C-IOLB	: 5	: 98	: 12	: 12
3. C-IOLC	: 10	: 98	: 11	: 11
4. L-IOLA	: 5	: 97	: 11	: 11
5. L-IOLB	: 5	: 96	: 11	: 12
6. L-IOLC	: 10	: 94	: 10	: 11

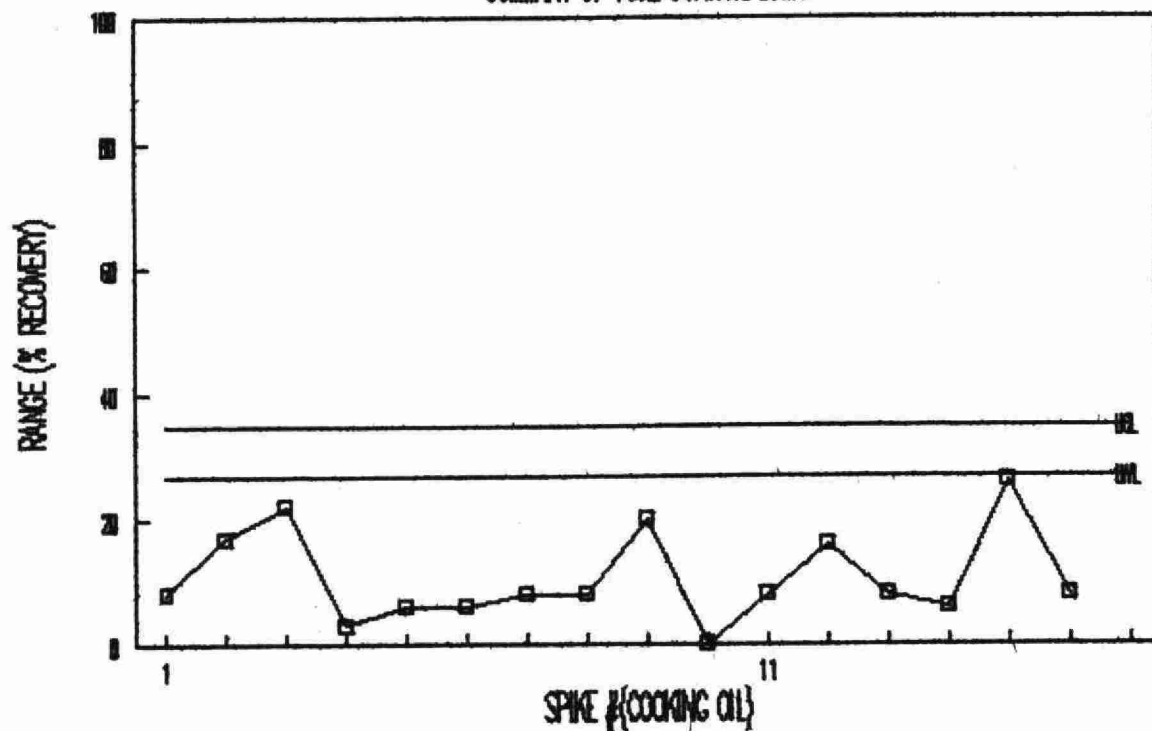
SOLVENT EXTRACTABLES: 5PPM-A

SUMMARY OF 1992 CONTROL DATA



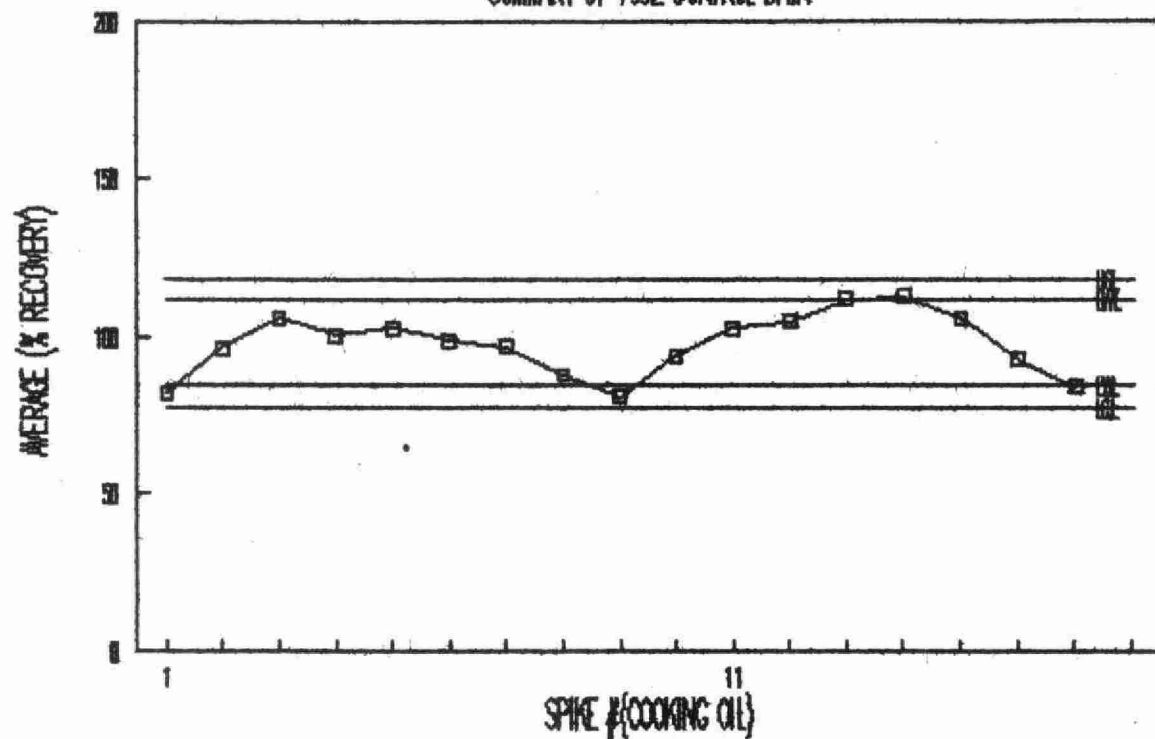
SOLVENT EXTRACTABLES: 5PPM-A

SUMMARY OF 1992 CONTROL DATA



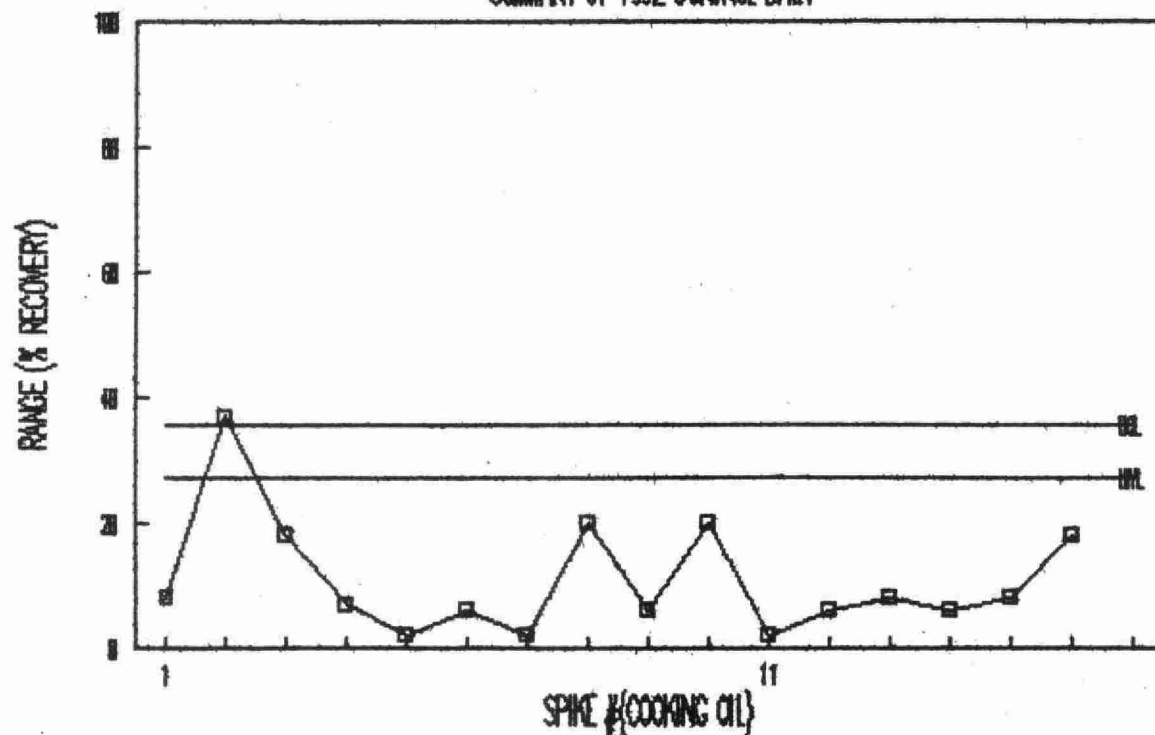
SOLVENT EXTRACTABLES: 5PPM-B

SUMMARY OF 1992 CONTROL DATA



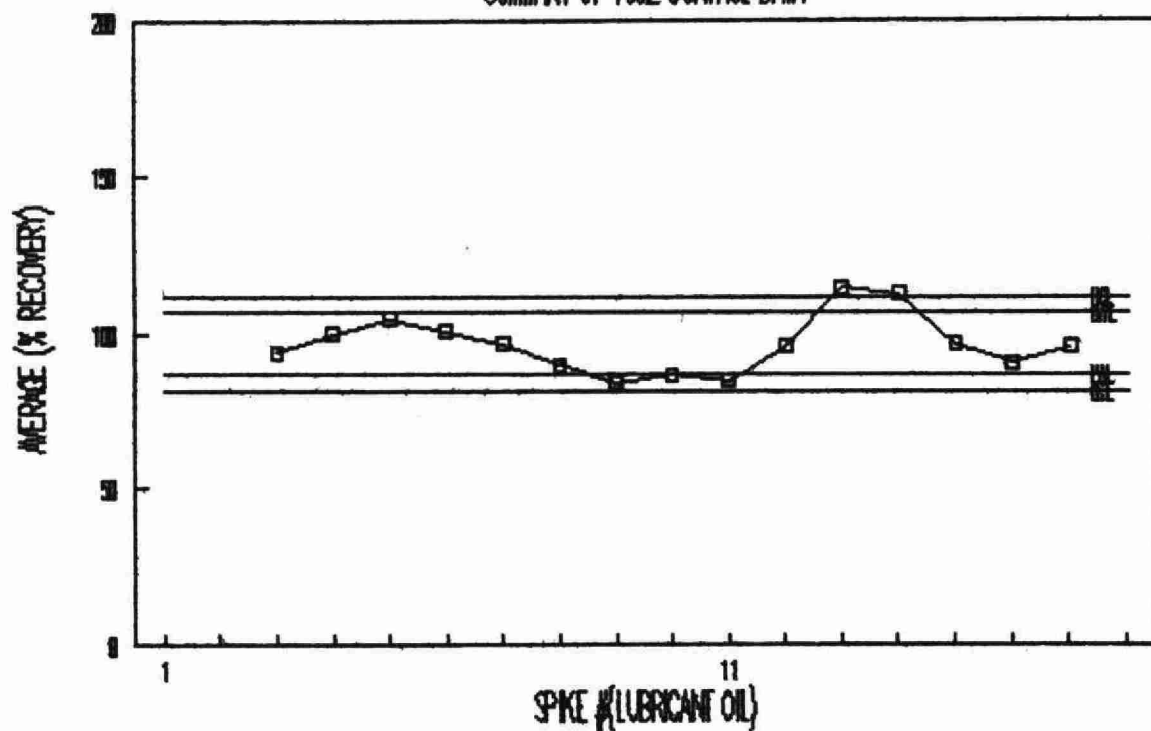
SOLVENT EXTRACTABLES: 5PPM-B

SUMMARY OF 1992 CONTROL DATA



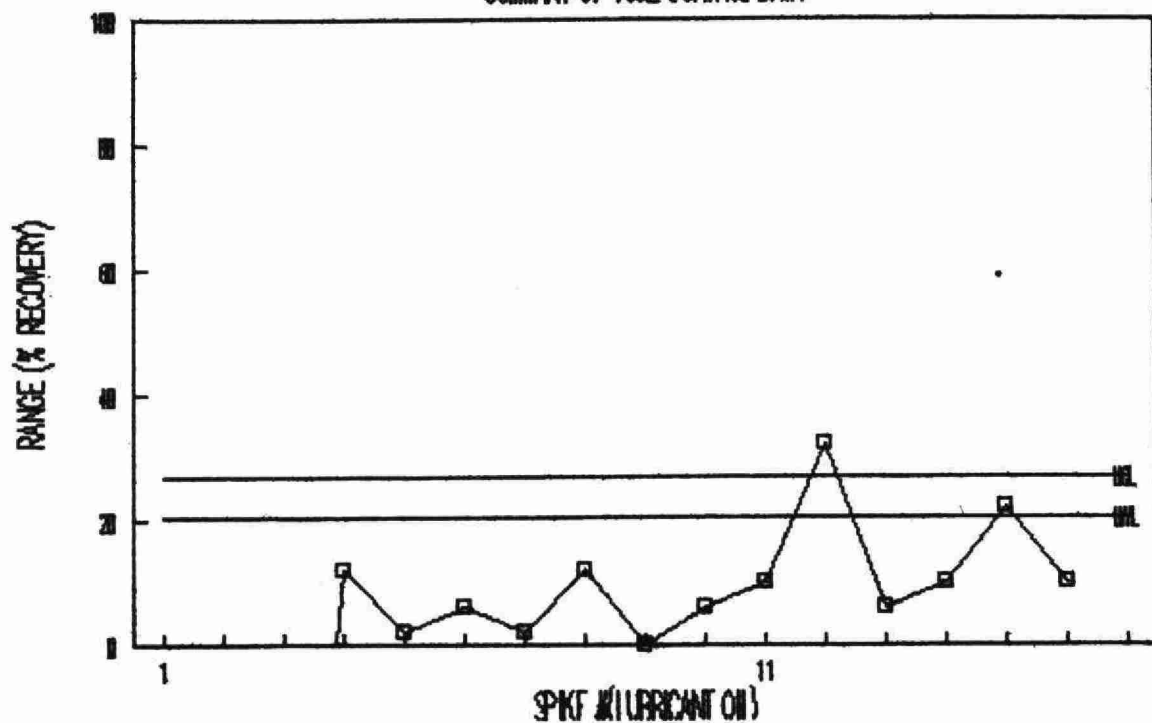
SOLVENT EXTRACTABLES: 5PPM-A

SUMMARY OF 1992 CONTROL DATA



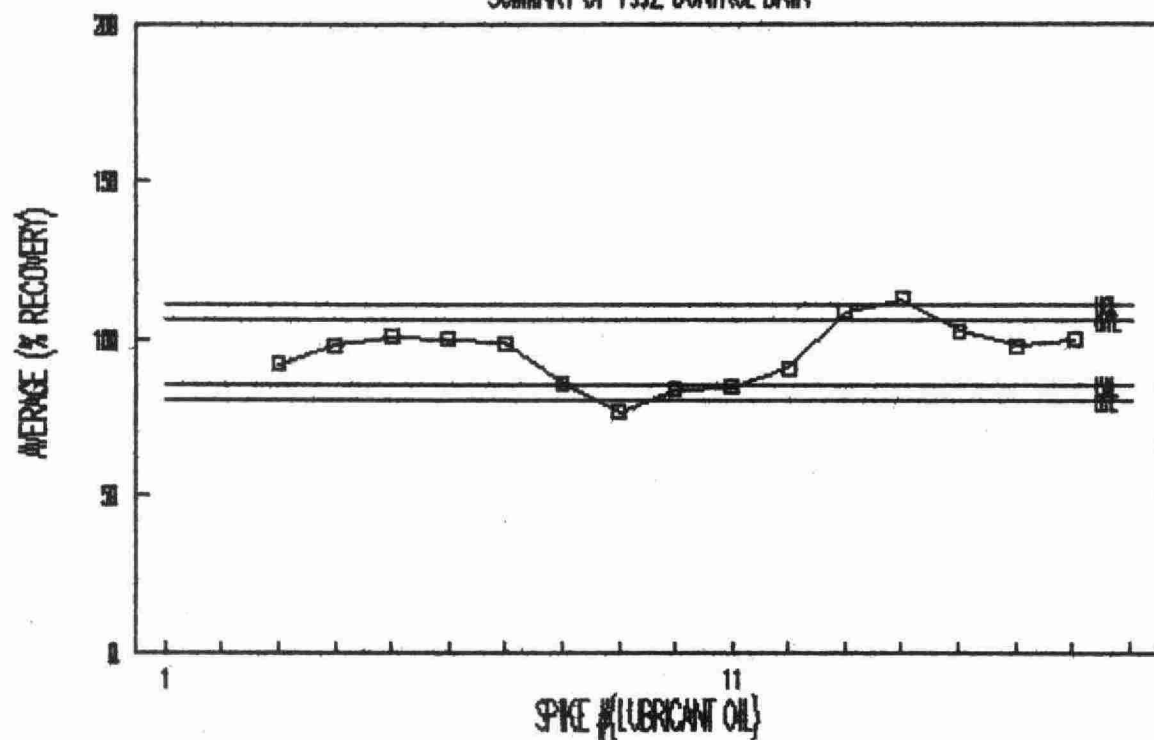
SOLVENT EXTRACTABLES: 5PPM-A

SUMMARY OF 1992 CONTROL DATA



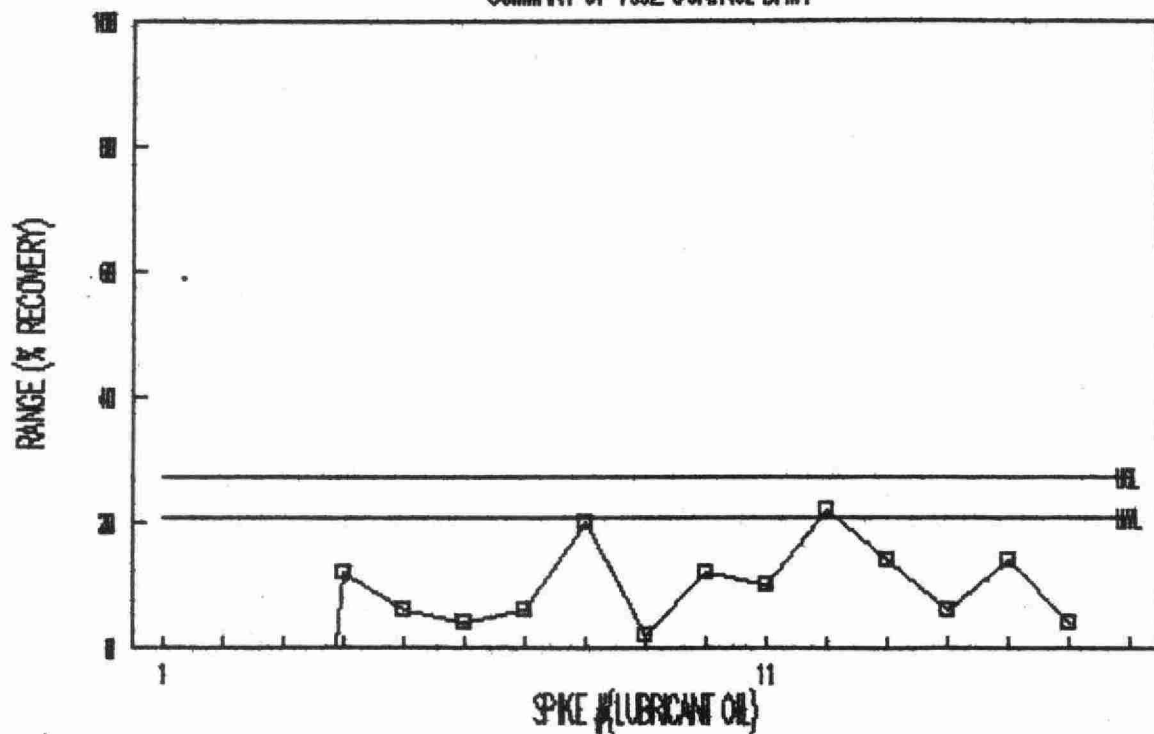
SOLVENT EXTRACTABLES: 5PPM-B

SUMMARY OF 1992 CONTROL DATA



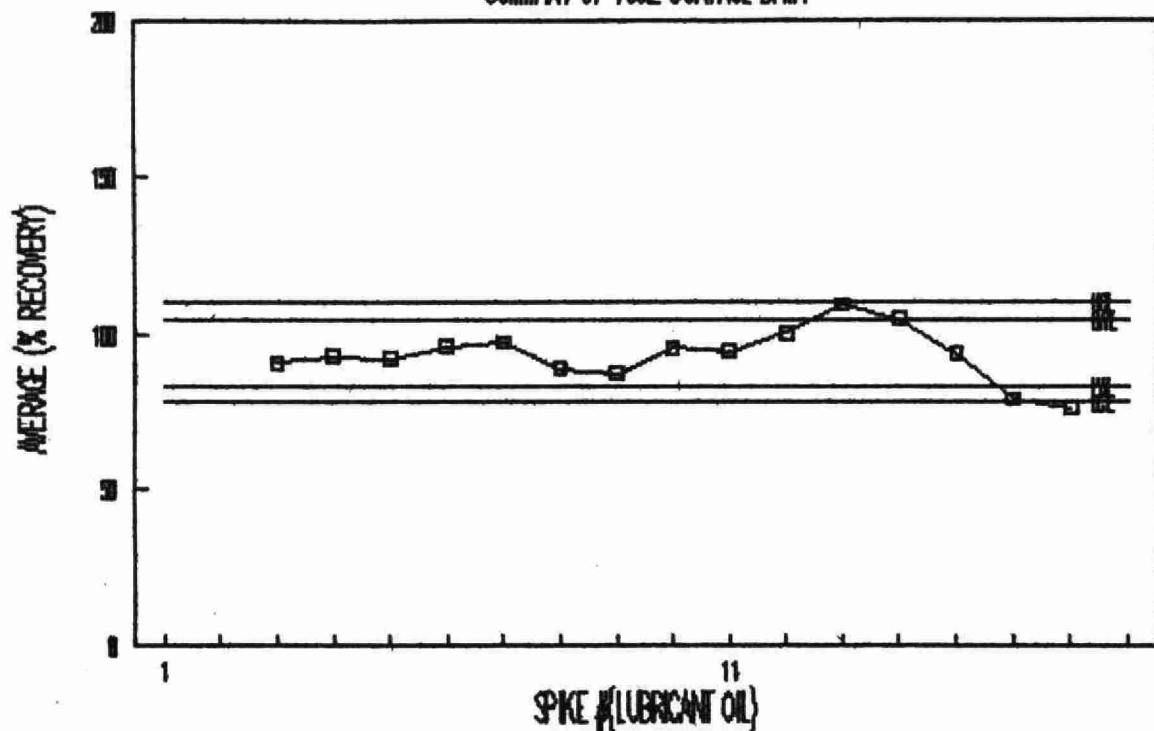
SOLVENT EXTRACTABLES: 5PPM-B

SUMMARY OF 1992 CONTROL DATA



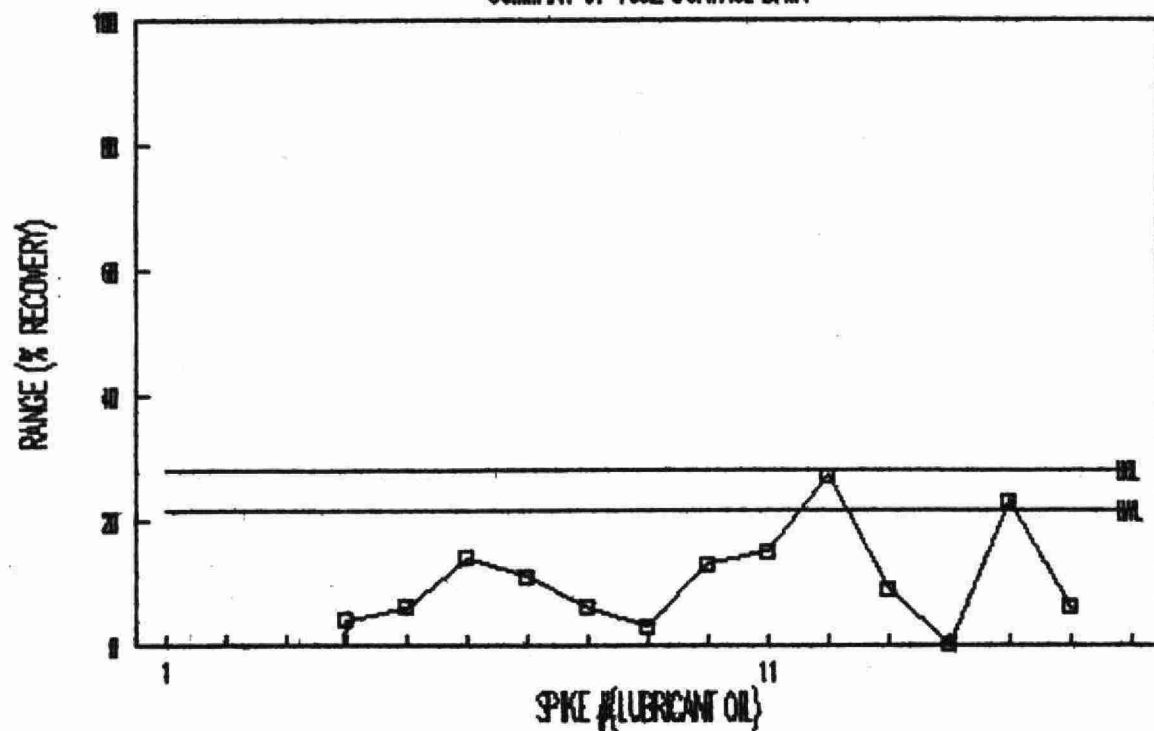
SOLVENT EXTRACTABLES: 10PPM

SUMMARY OF 1992 CONTROL DATA



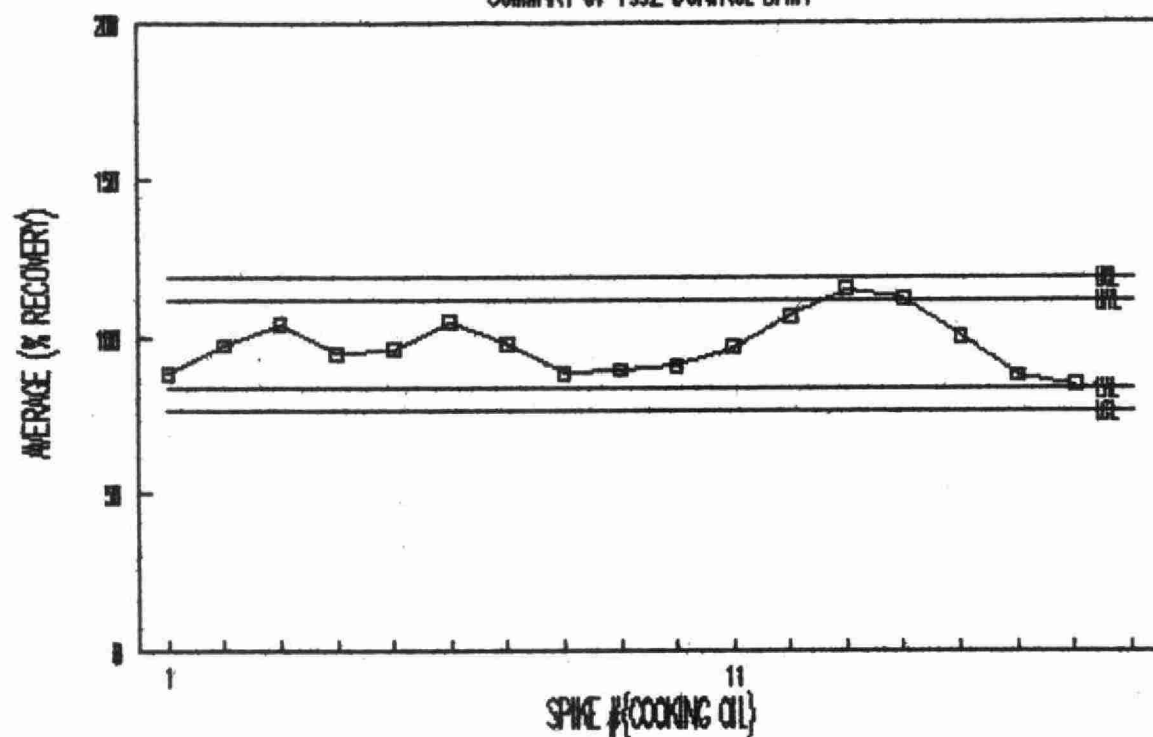
SOLVENT EXTRACTABLES: 10PPM

SUMMARY OF 1992 CONTROL DATA



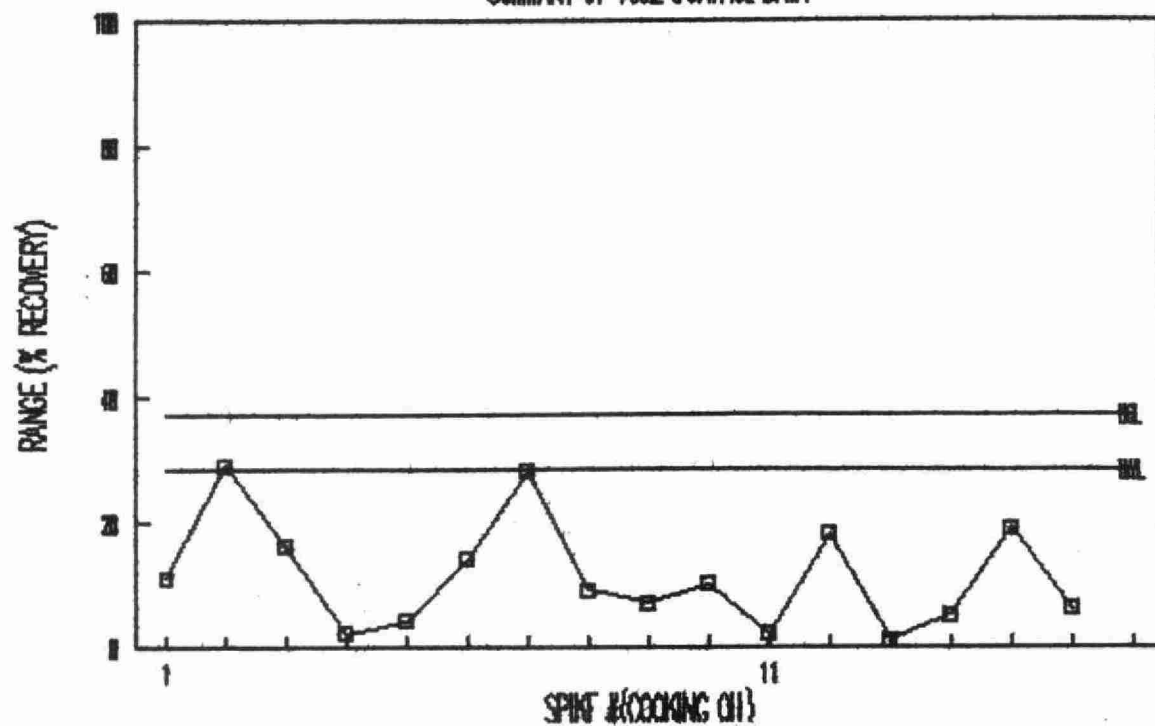
SOLVENT EXTRACTABLES: 10PPM

SUMMARY OF 1992 CONTROL DATA



SOLVENT EXTRACTABLES: 10PPM

SUMMARY OF 1992 CONTROL DATA



ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: PAAPCB E3125A

SAMPLE TYPE: AIR

UNIT: AIR MONITORING

SUPERVISOR: DR. B. FOSTER

PRINCIPLE OF METHOD:

Polychlorinated biphenyls (PCB's) are synthetic compounds manufactured by the progressive chlorination of biphenyl. They are marketed under such trade names as Aroclor.

PARAMETERS MEASURED:

CB/PCB Spike Standard

1,3,5 trichlorobenzene	
2,4,5 trichlorotoluene	
1,2,3,4 tetrachlorobenzene	
1,2,4,5 tetrachlorobenzene	
HCB	- hexachlorobenzene
PCB 8	- 2,4' dichlorobiphenyl
PCB 18	- 2,2',5 trichlorobiphenyl
PCB 49	- 2,2',4,5' tetrachlorobiphenyl
PCB 87	- 2,2',3,4,5' pentachlorobiphenyl
PCB 158	- 2,3,3',4,4',6 hexachlorobiphenyl
PCB 191	- 2,3,3',4,4',5,6 heptachlorobiphenyl
PCB 198	- 2,2',3,3',4,5,5',6 octachlorobiphenyl
PCB 206	- 2,2',3,3',4,4',5,5',6 nonachlorobiphenyl
PCB 209	- 2,2',3,3',4,4',5,5',6,6' decachlorobiphenyl

REPORTING RESULTS:

Results are reported in ug/m3.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC samples.

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Impurities known to be present in commercial PCB's and in ambient air can produce interferences when analyzed by GC-ECD.

UNIT: AIR MONITORING
 WORKSTATION: PAAPCB
 TIME PERIOD: JAN.-DEC.1992

MATRIX: AIR
 INSTRUMENT: GC
 NO. OBSERVATIONS: 5

YEARLY CALCULATION

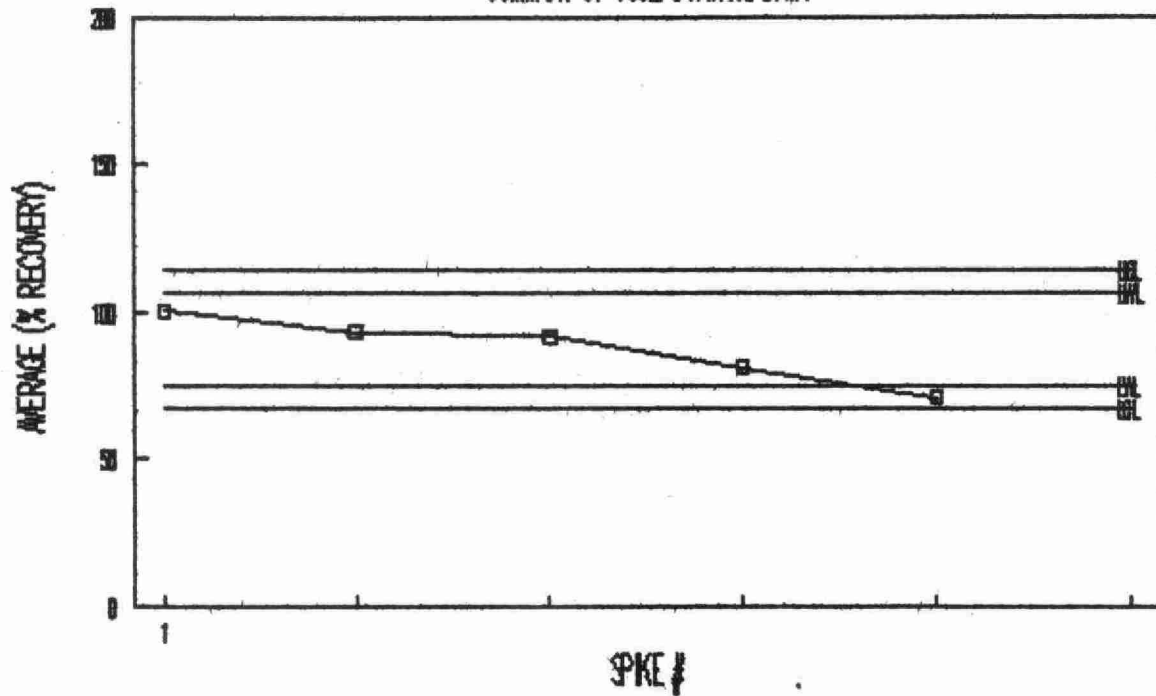
PARAMETER COMPOUND	CONCENTRATION		AVG. SPK. % REC.		STD. DEV. %REC.		% C.V.	
1. 135 TCB	:	10	:	91	:	11	:	12
2. 245 TCT	:	10	:	95	:	14	:	15
3. 1234 TCB	:	10	:	92	:	15	:	16
4. 1245 TCB	:	10	:	86	:	23	:	26
5. PCB 8	:	101.45	:	105	:	11	:	11
6. PCB 18	:	26.3	:	95	:	12	:	13
7. PCB49	:	10.4	:	103	:	16	:	15
8. PCB87	:	14.5	:	96	:	15	:	15
9. PCB158	:	9.9	:	102	:	17	:	16
10.PCB191	:	9.8	:	91	:	18	:	20
11.PCB 198	:	8.5	:	102	:	20	:	19
12.PCB206	:	10.3	:	97	:	22	:	22
13.PCB209	:	10.1	:	97	:	16	:	17
14.135TBB	:	4.0	:	98	:	16	:	16

SURROGATE IN SAMPLE

15. TB	:	4.0	:	89	:	28	:	32
16. FB	:	4.0	:	100	:	11	:	11
17. SAMPLE	:	4.0	:	114	:	15	:	12
18. SURR	:	4.0	:	117	:	15	:	12

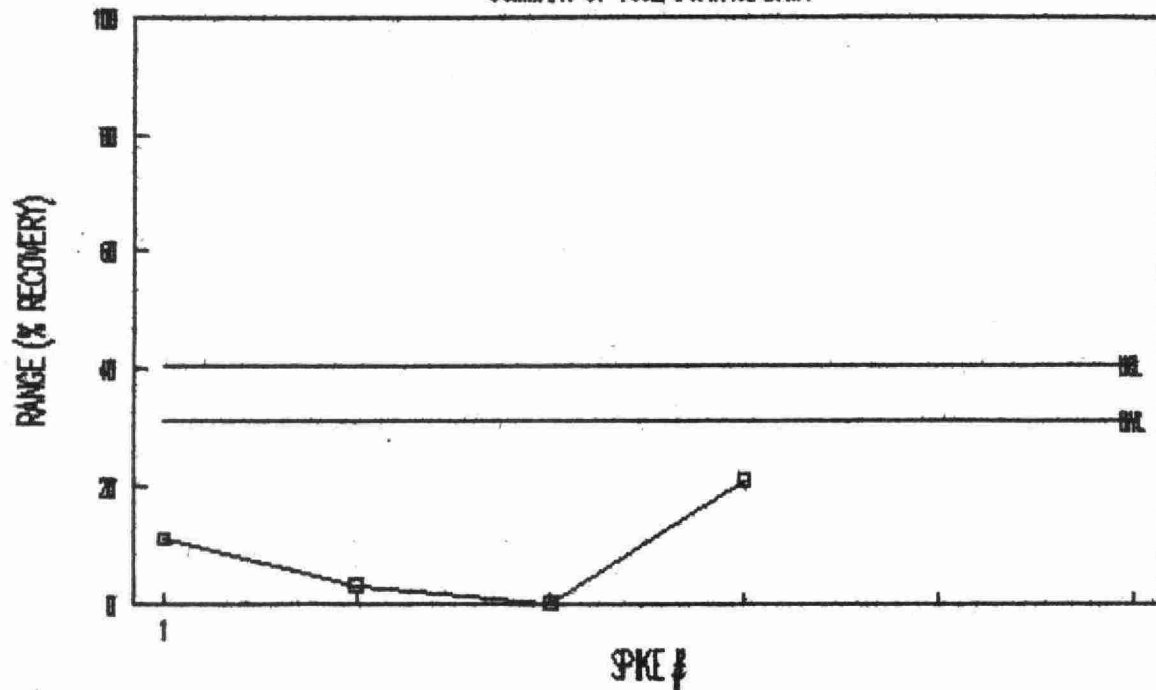
PCBAIR:135TCB

SUMMARY OF 1992 CONTROL DATA



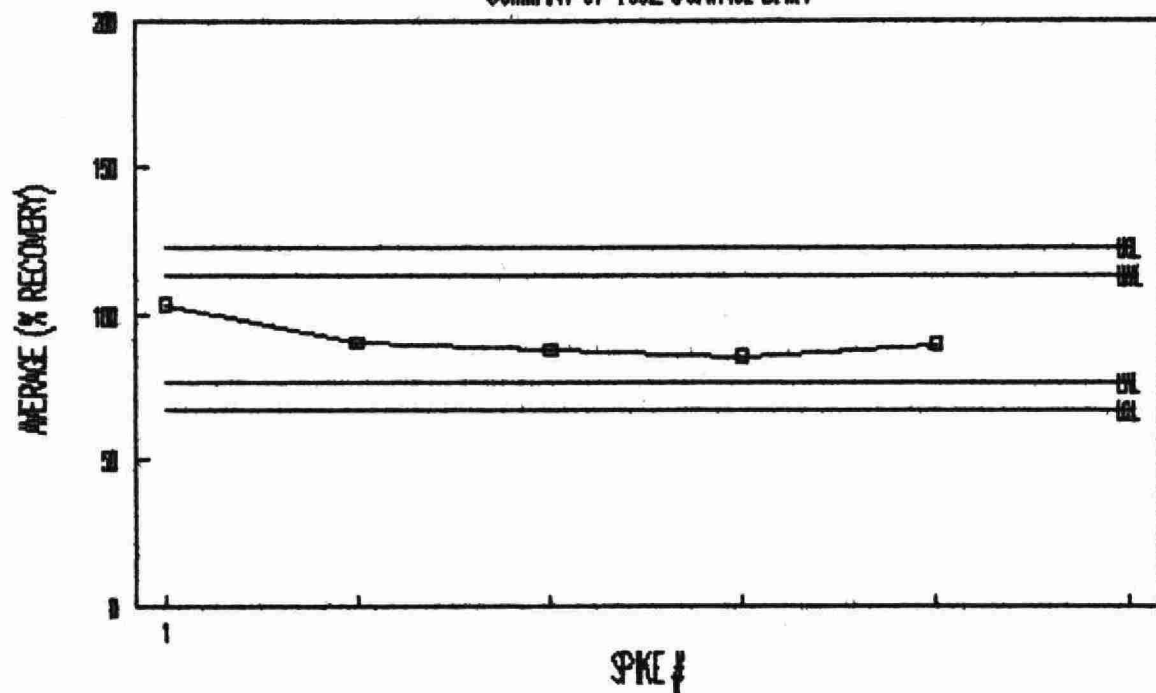
PCBAIR:135TCB

SUMMARY OF 1992 CONTROL DATA



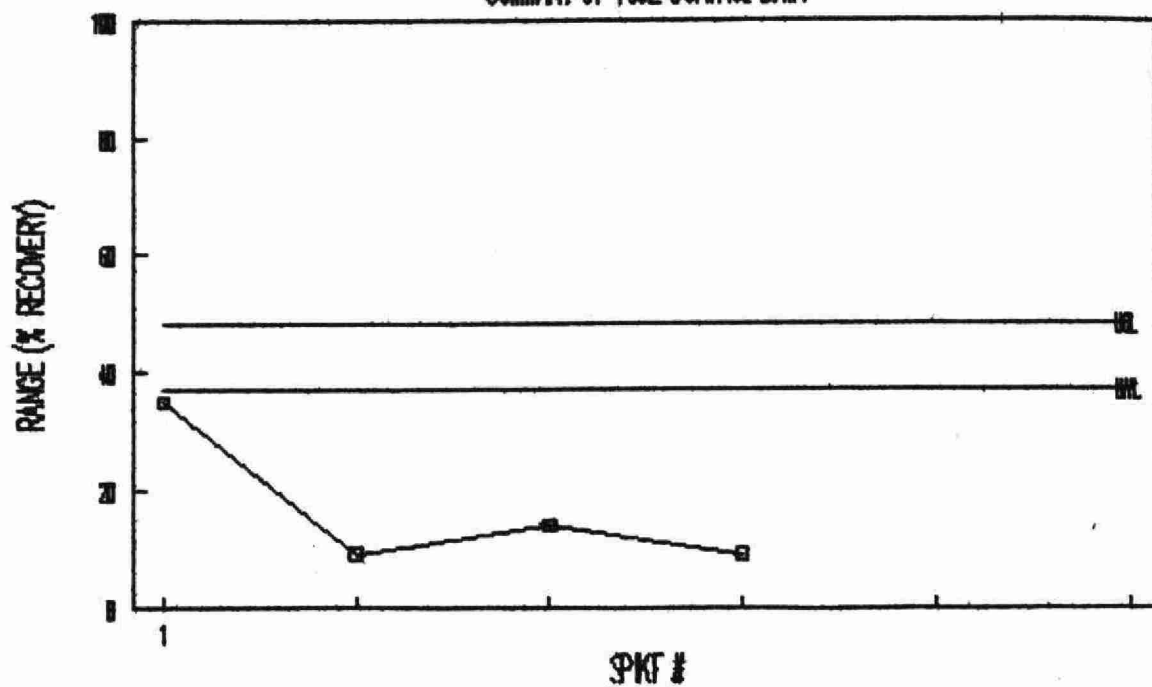
PCBAIR:245TCT

SUMMARY OF 1992 CONTROL DATA



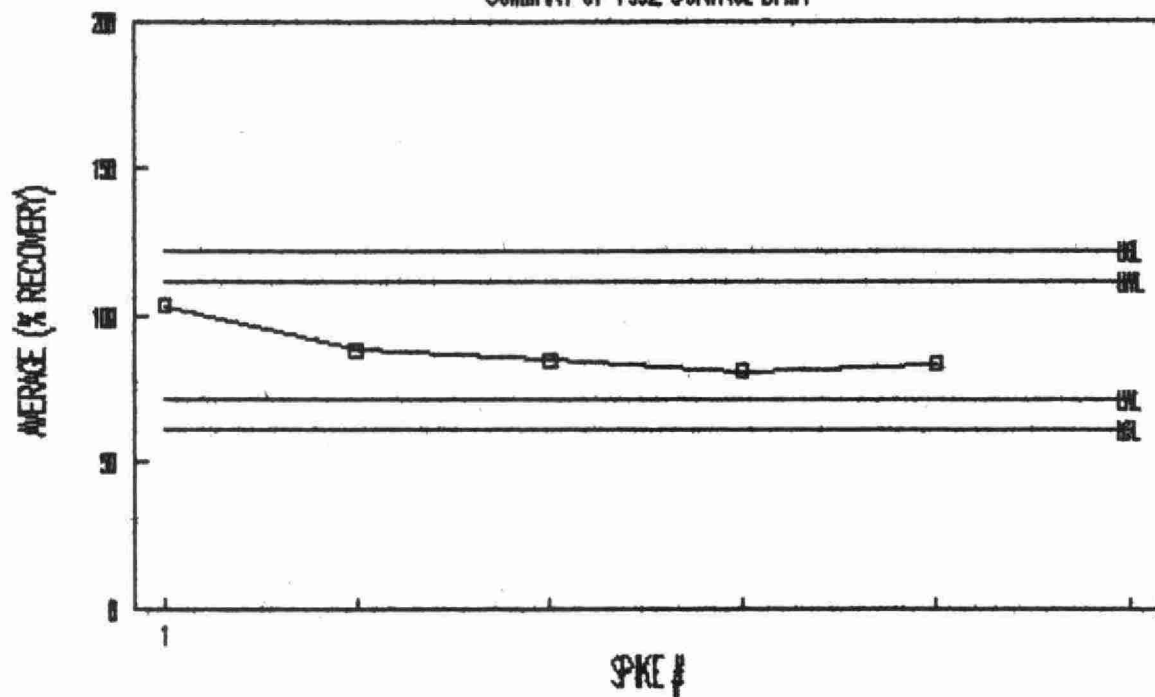
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SUMMARY OF 1992 CONTROL DATA



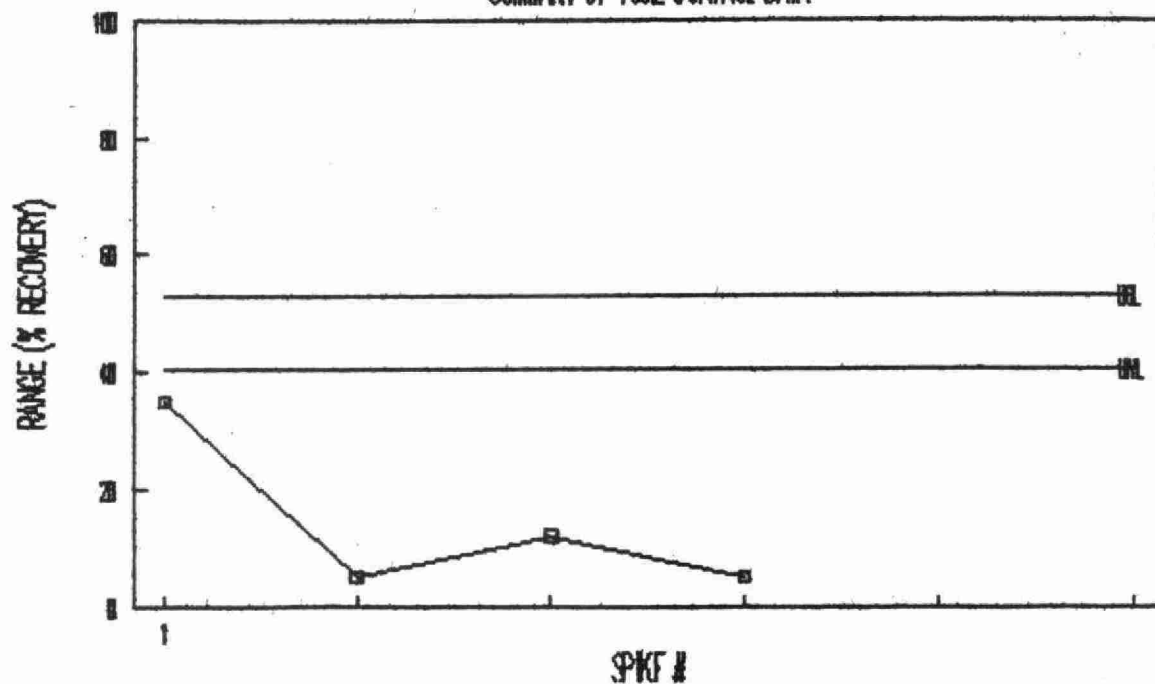
PCBAIR:1234CB

SUMMARY OF 1992 CONTROL DATA



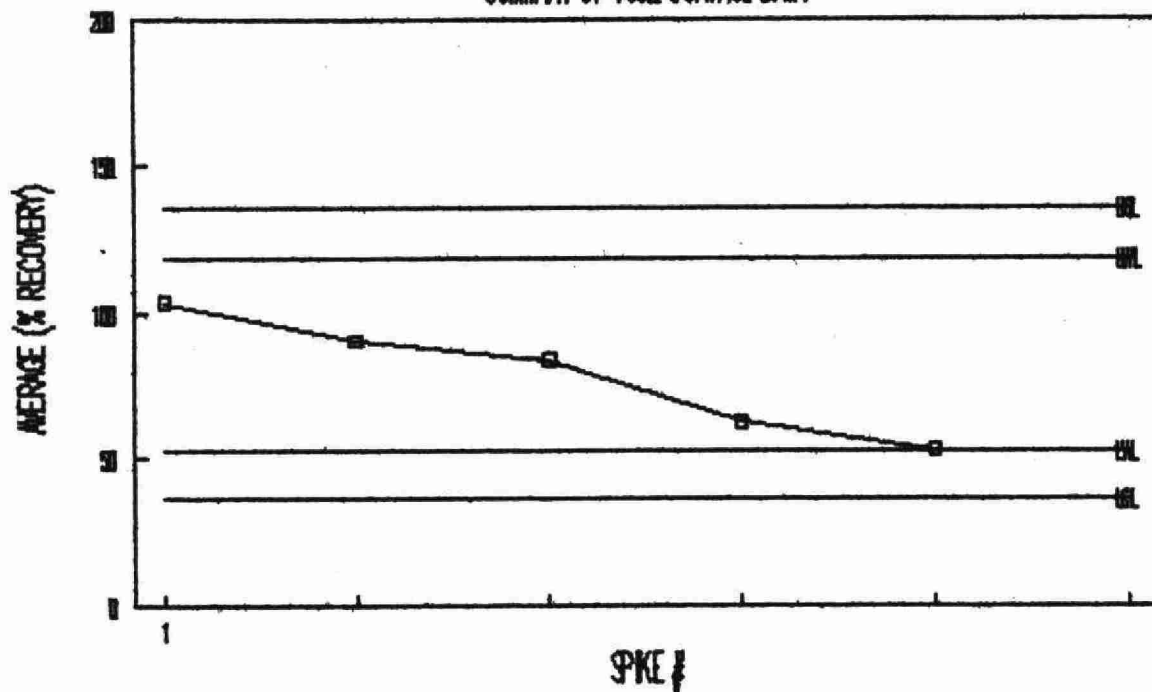
PCBAIR:1234CB

SUMMARY OF 1992 CONTROL DATA



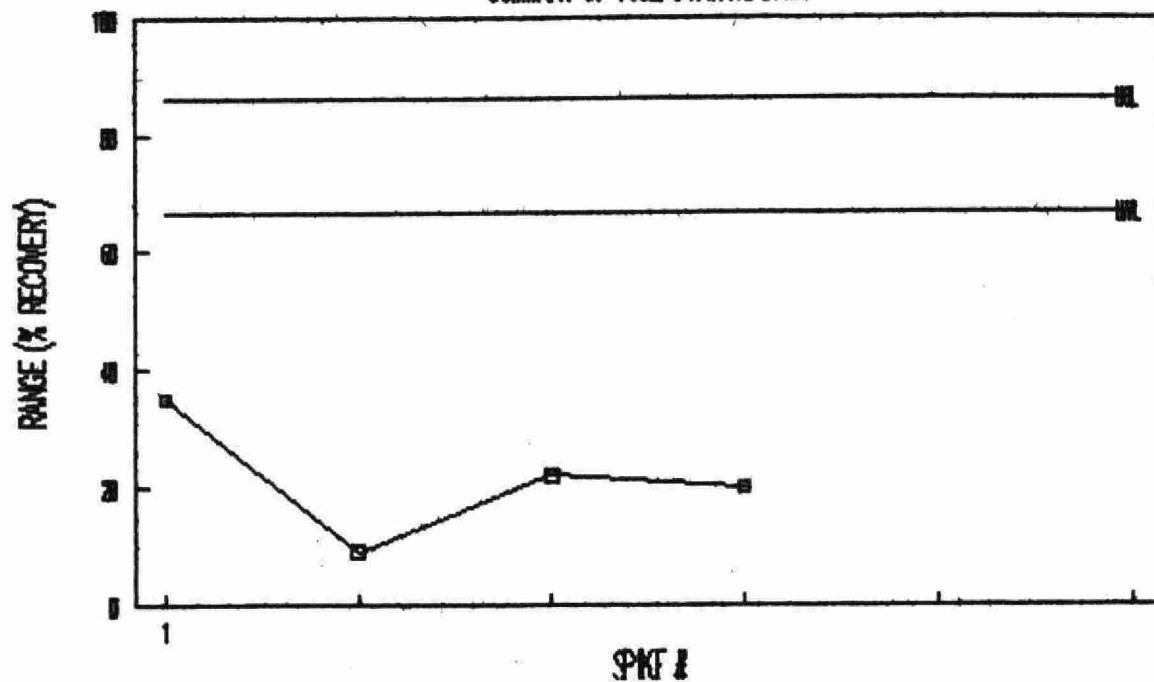
PCBAIR:1245CB

SUMMARY OF 1992 CONTROL DATA



PCBAIR:1245CB

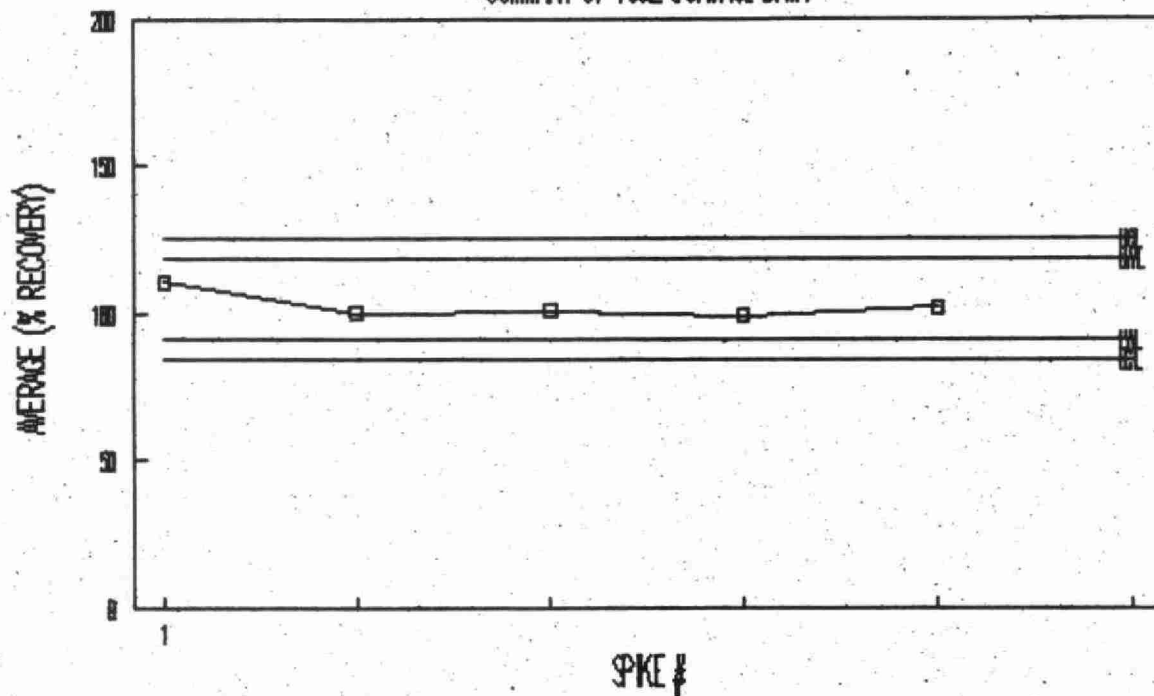
SUMMARY OF 1992 CONTROL DATA



5

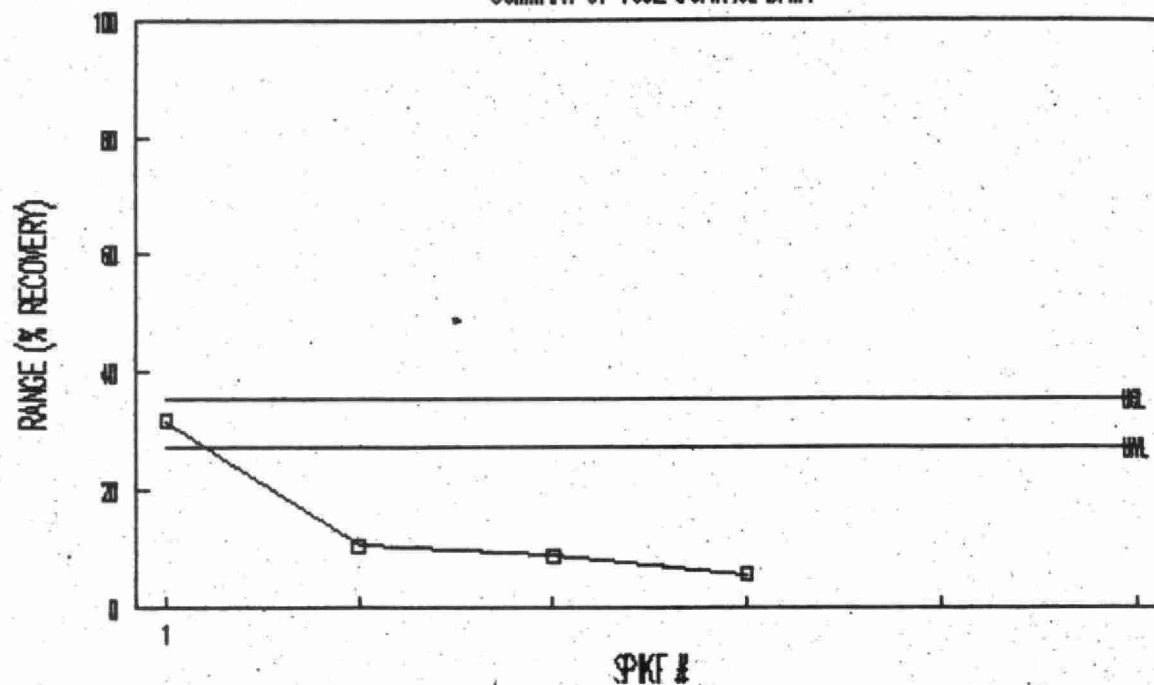
PCBAIR:2CLBPH

SUMMARY OF 1992 CONTROL DATA



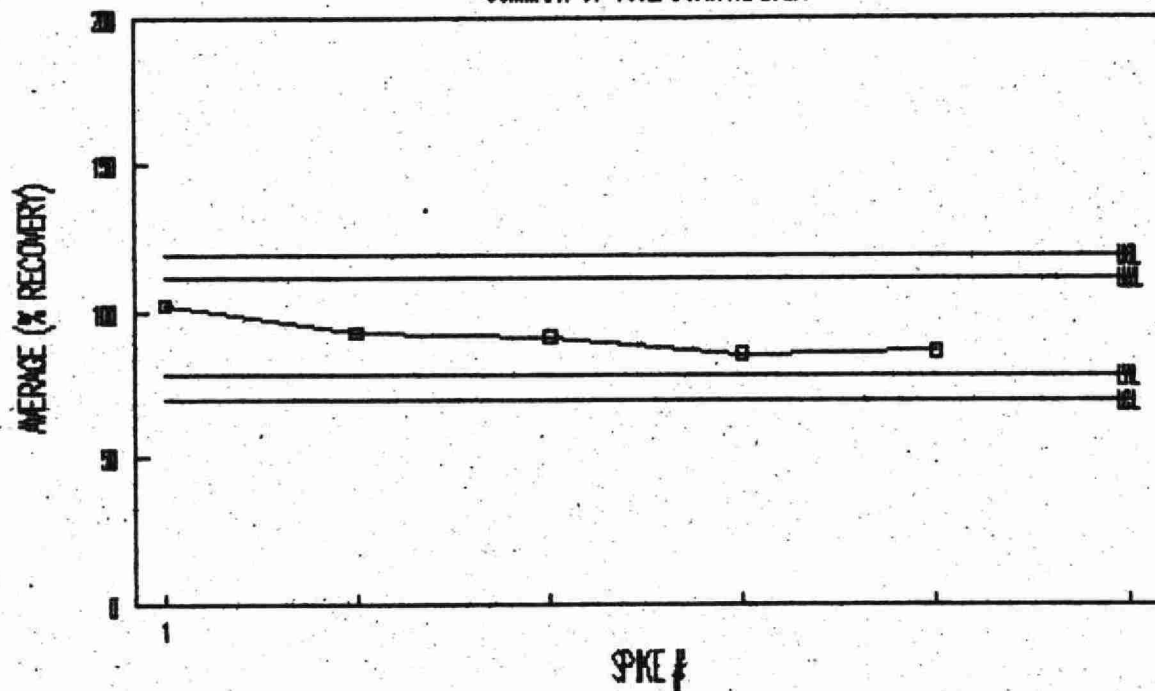
PCBAIR:2CLBPH

SUMMARY OF 1992 CONTROL DATA



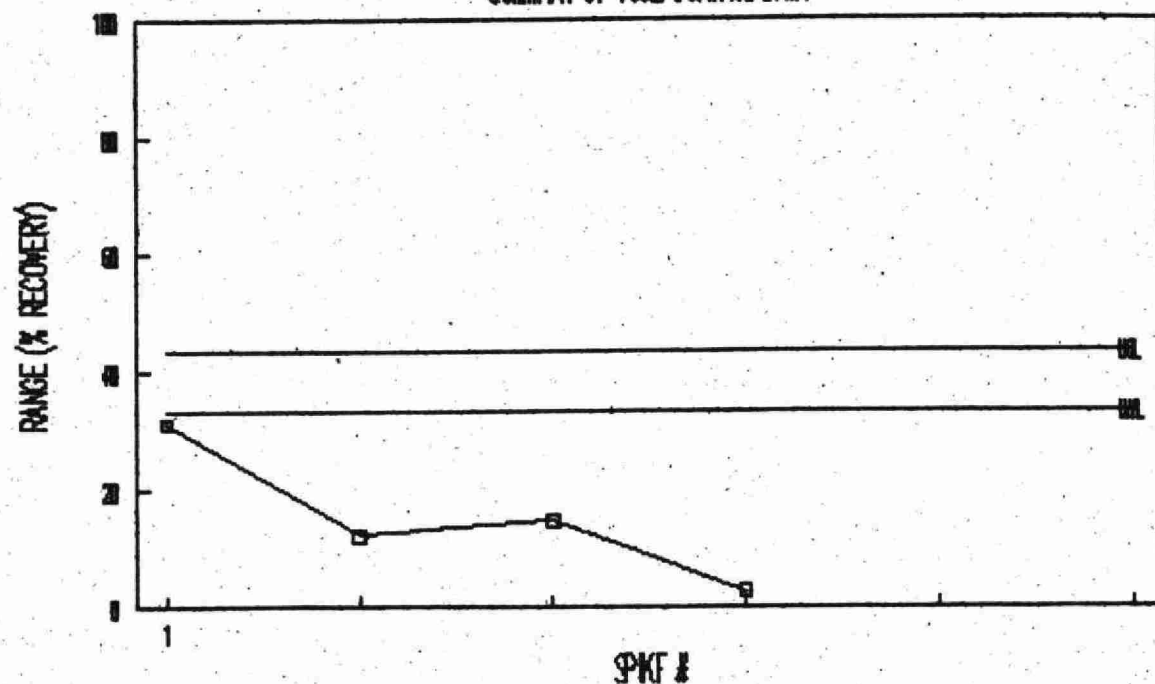
PCBAIR:3CLBPH

SUMMARY OF 1992 CONTROL DATA



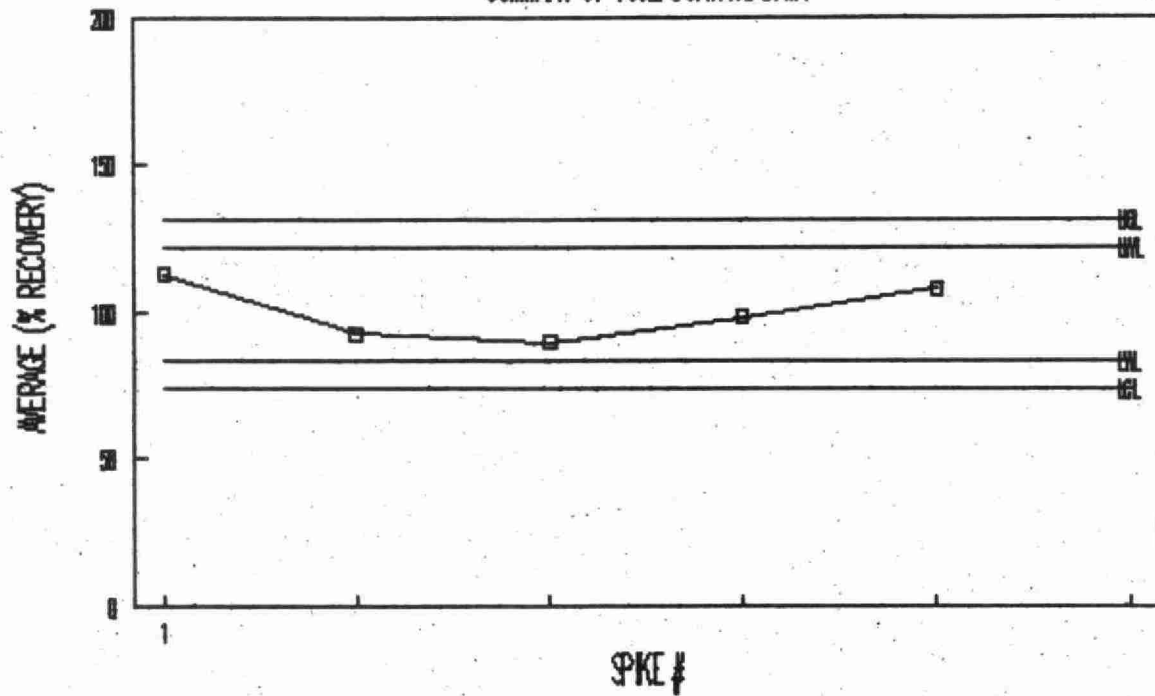
PCBAIR:3CLBPH

SUMMARY OF 1992 CONTROL DATA



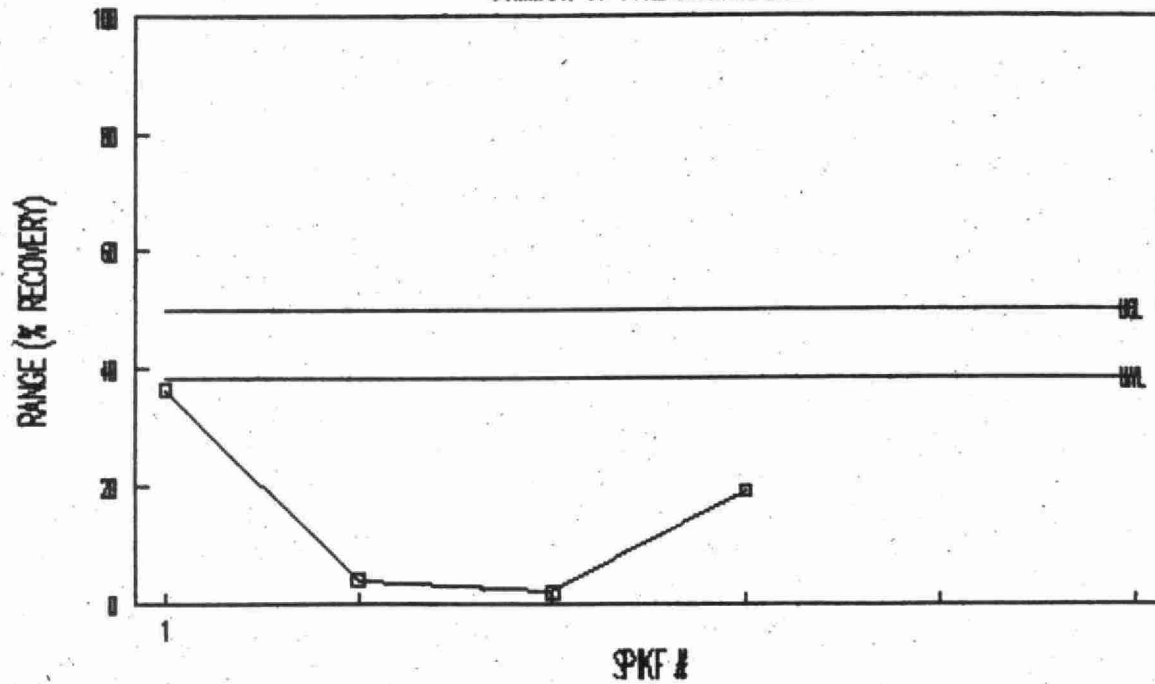
PCBAIR:4CLBPH

SUMMARY OF 1992 CONTROL DATA



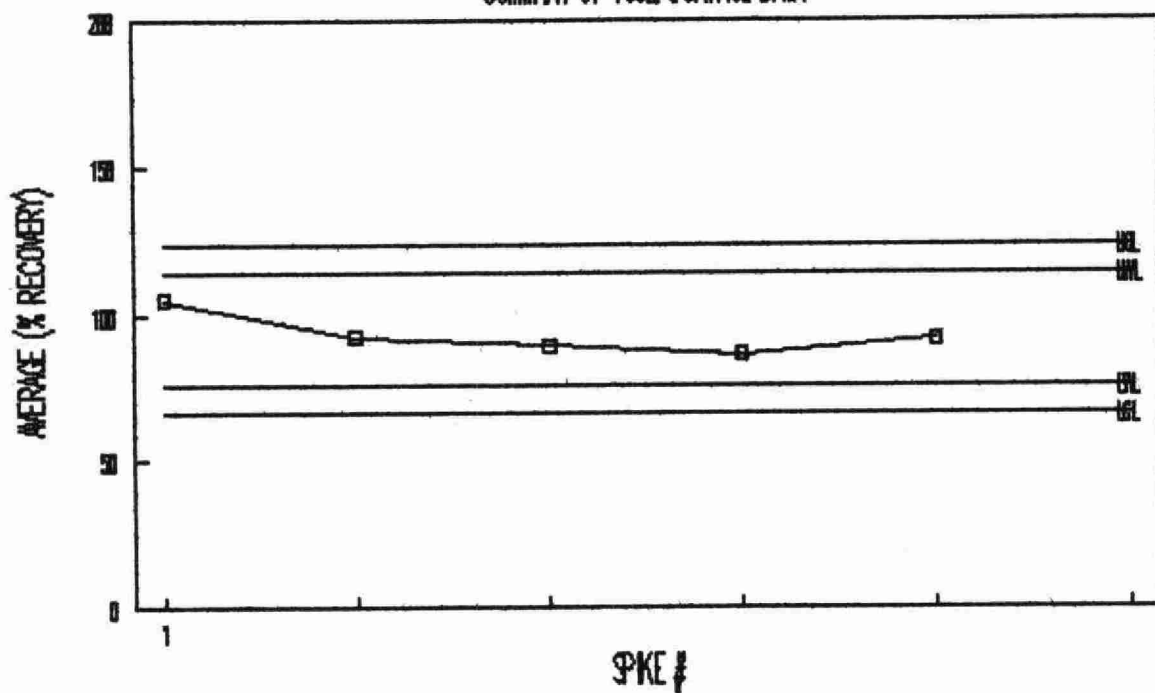
PCBAIR:4CLBPH

SUMMARY OF 1992 CONTROL DATA



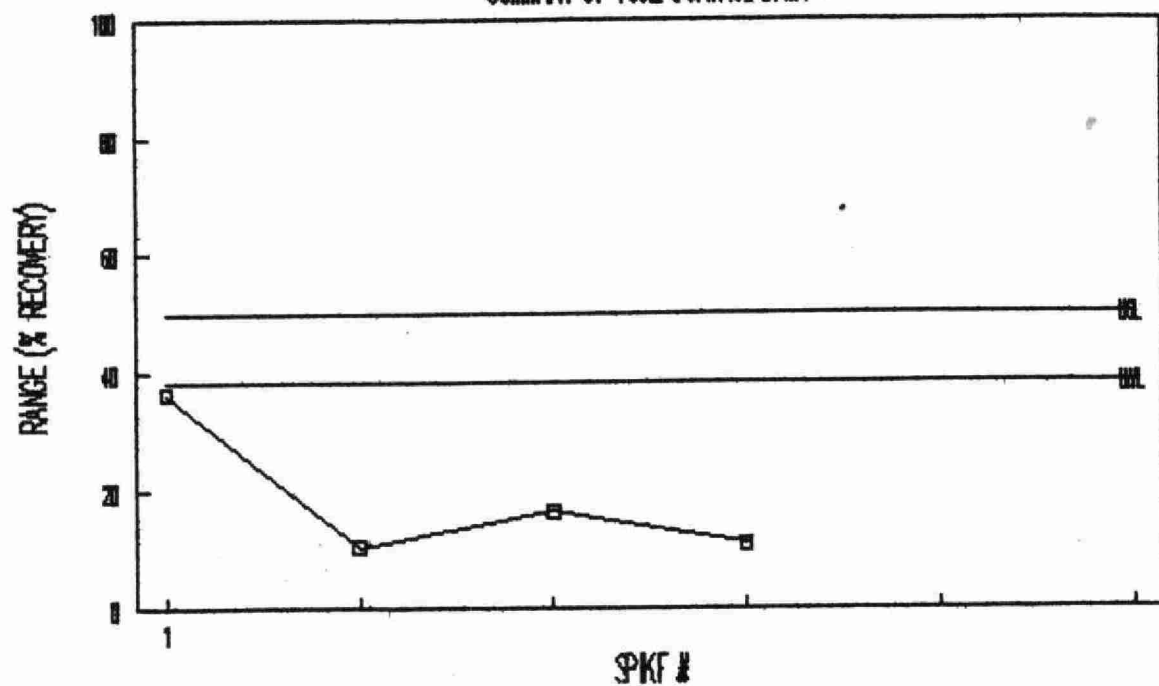
PCBAIR:5CLBPH

SUMMARY OF 1992 CONTROL DATA



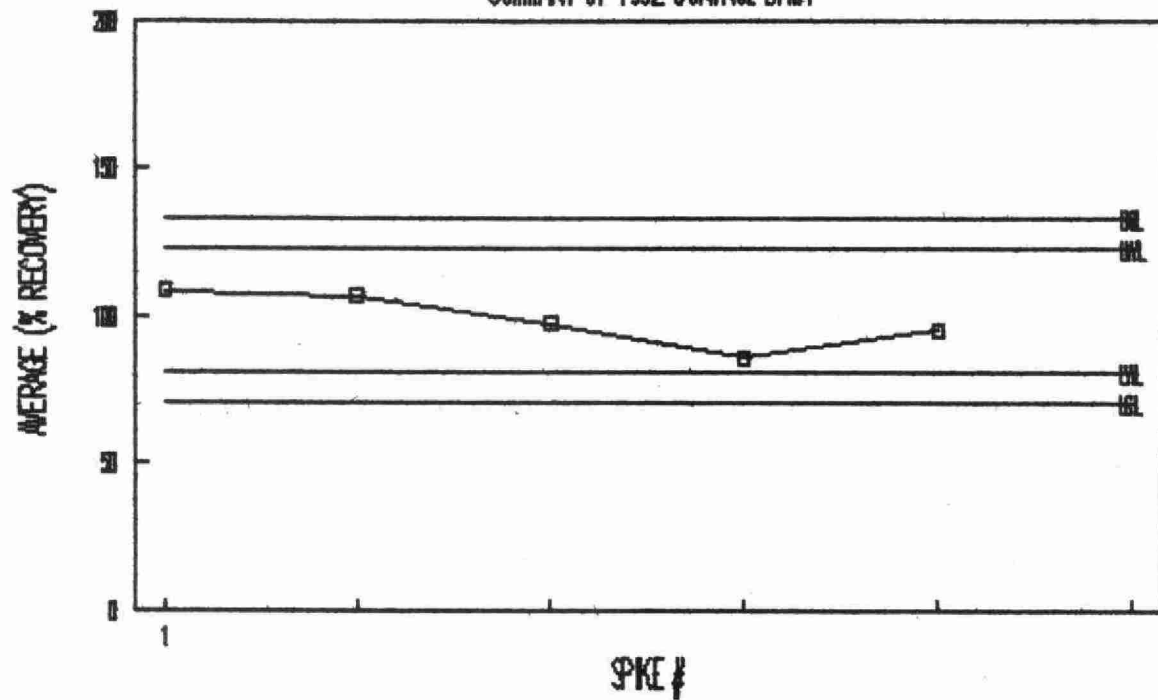
PCBAIR:5CLBPH

SUMMARY OF 1992 CONTROL DATA



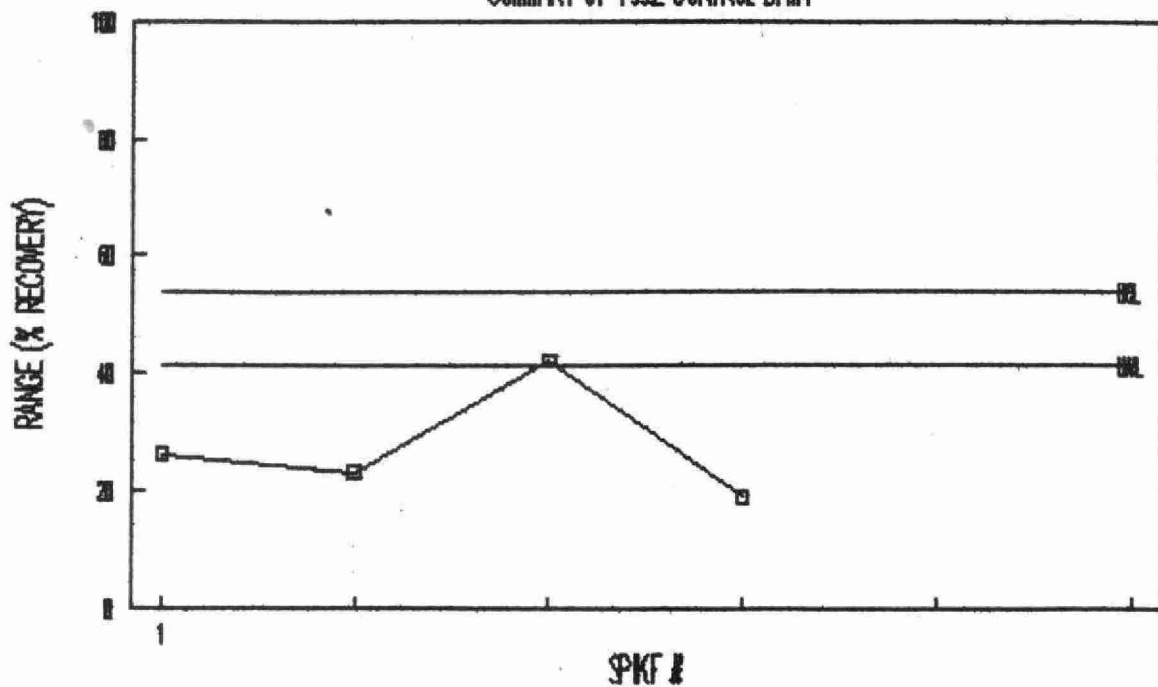
PCBAIR:6CLBPH

SUMMARY OF 1992 CONTROL DATA



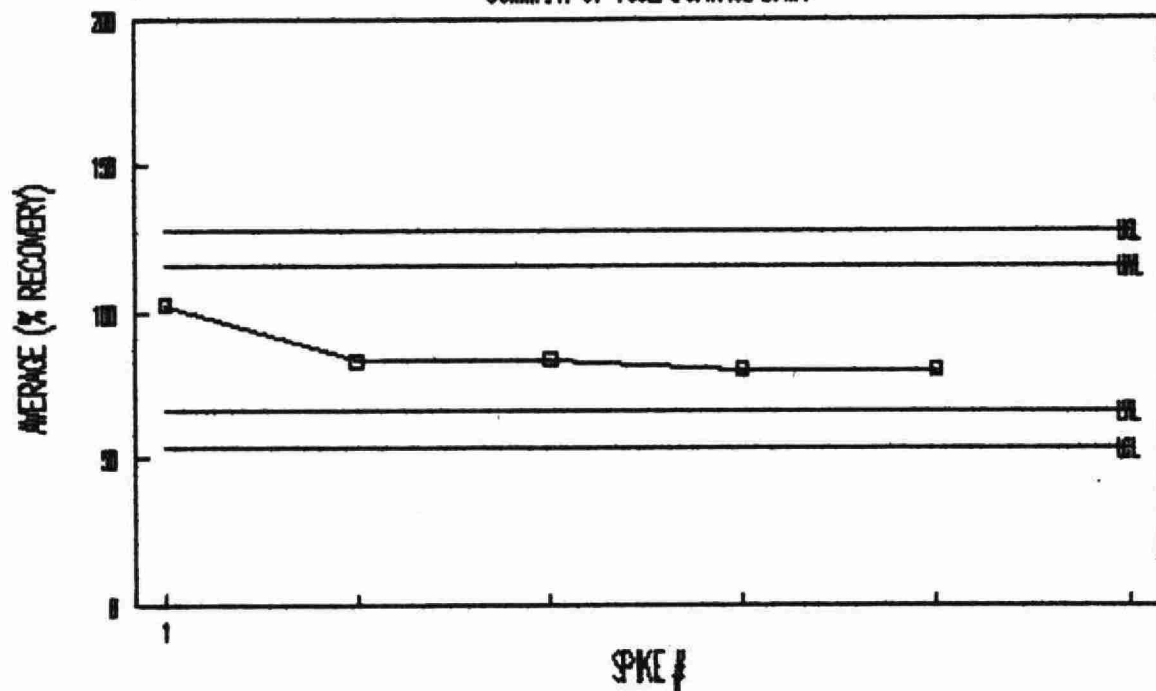
PCBAIR:6CLBPH

SUMMARY OF 1992 CONTROL DATA



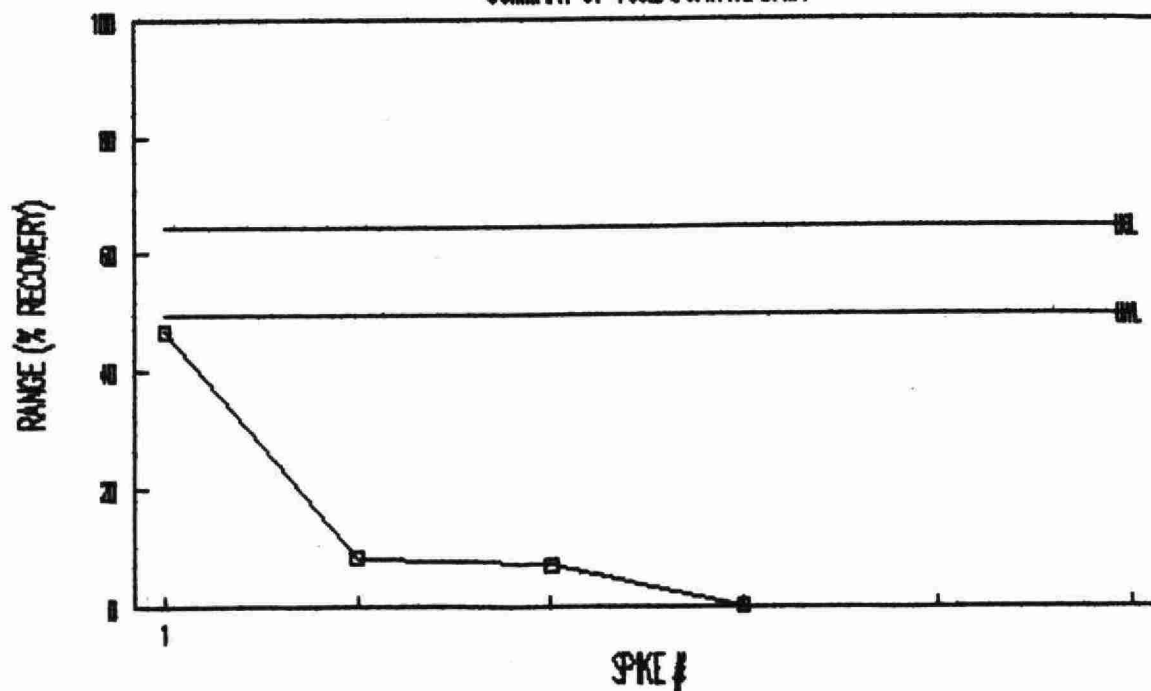
PCBAIR:7CLBPH

SUMMARY OF 1992 CONTROL DATA



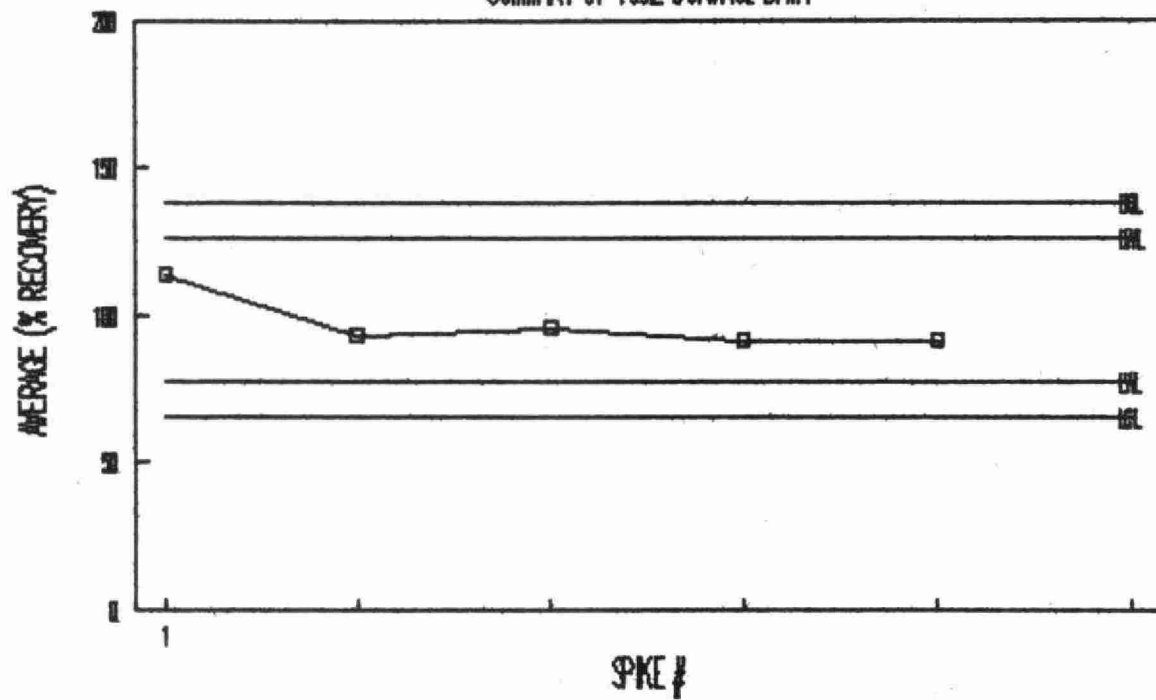
PCBAIR:7CLBPH

SUMMARY OF 1992 CONTROL DATA



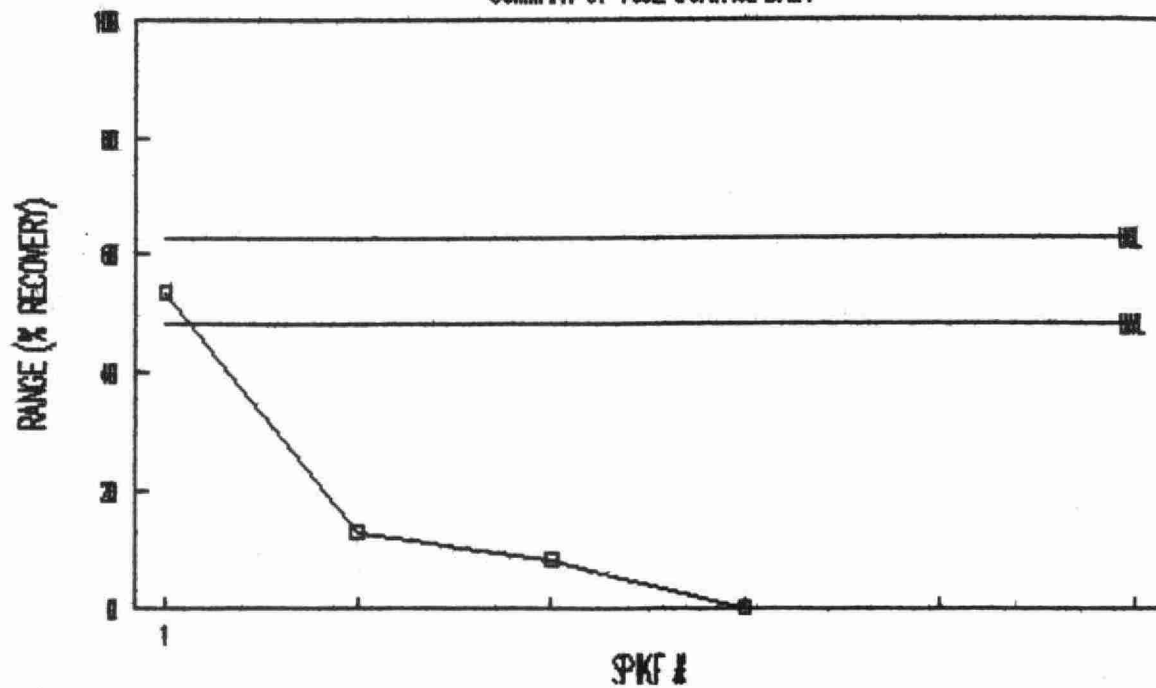
PCBAIR:8CLBPH

SUMMARY OF 1992 CONTROL DATA



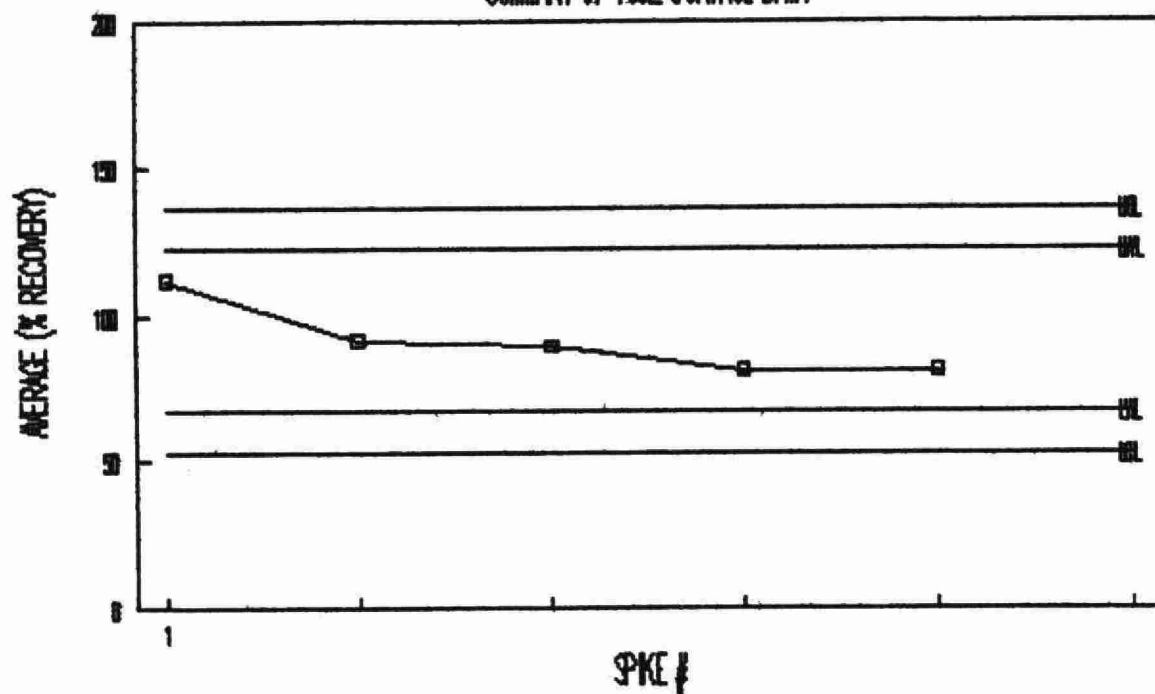
PCBAIR:8CLBPH

SUMMARY OF 1992 CONTROL DATA



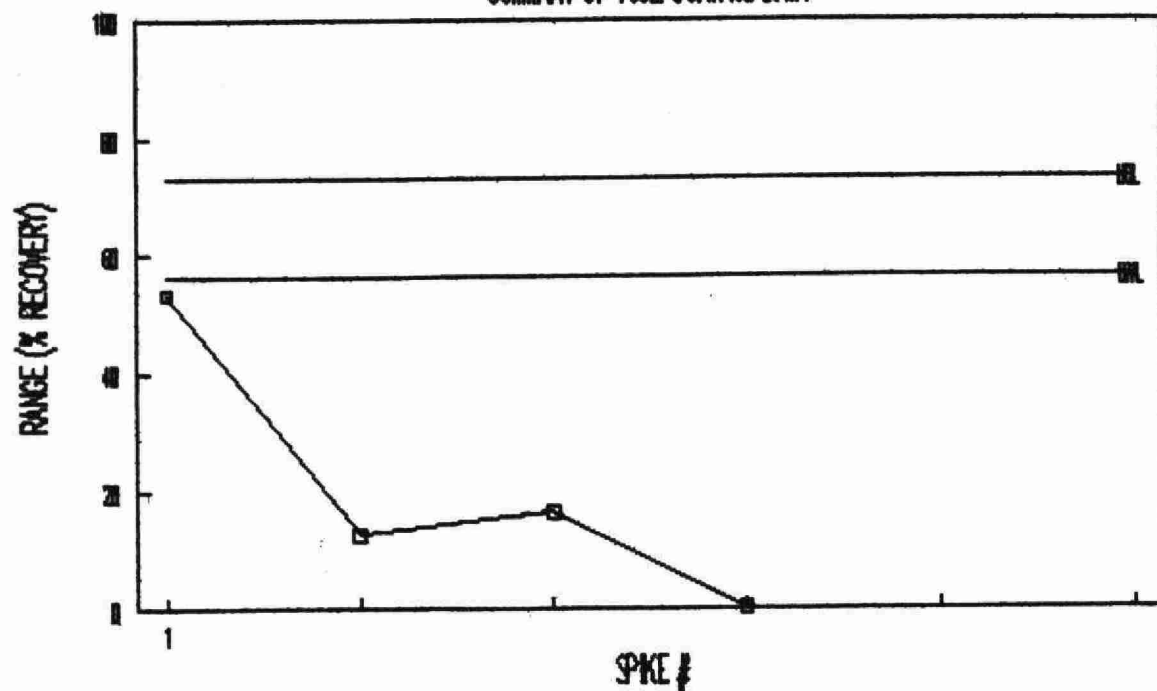
PCBAIR:9CLBPH

SUMMARY OF 1992 CONTROL DATA



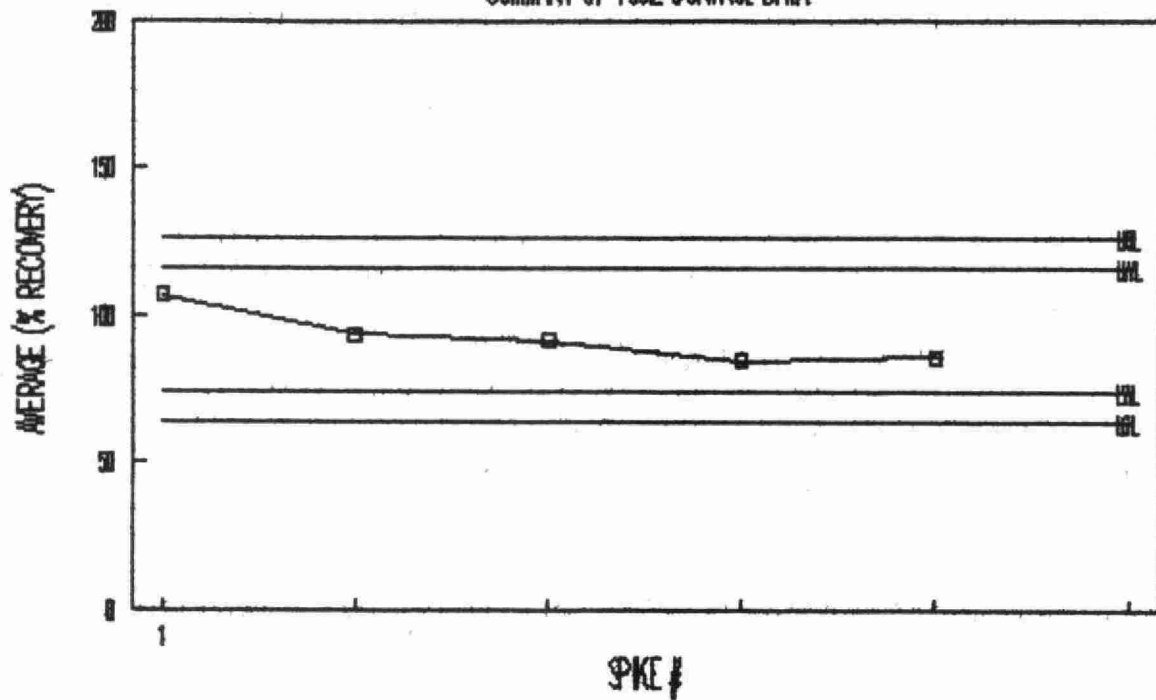
PCBAIR:9CLBPH

SUMMARY OF 1992 CONTROL DATA



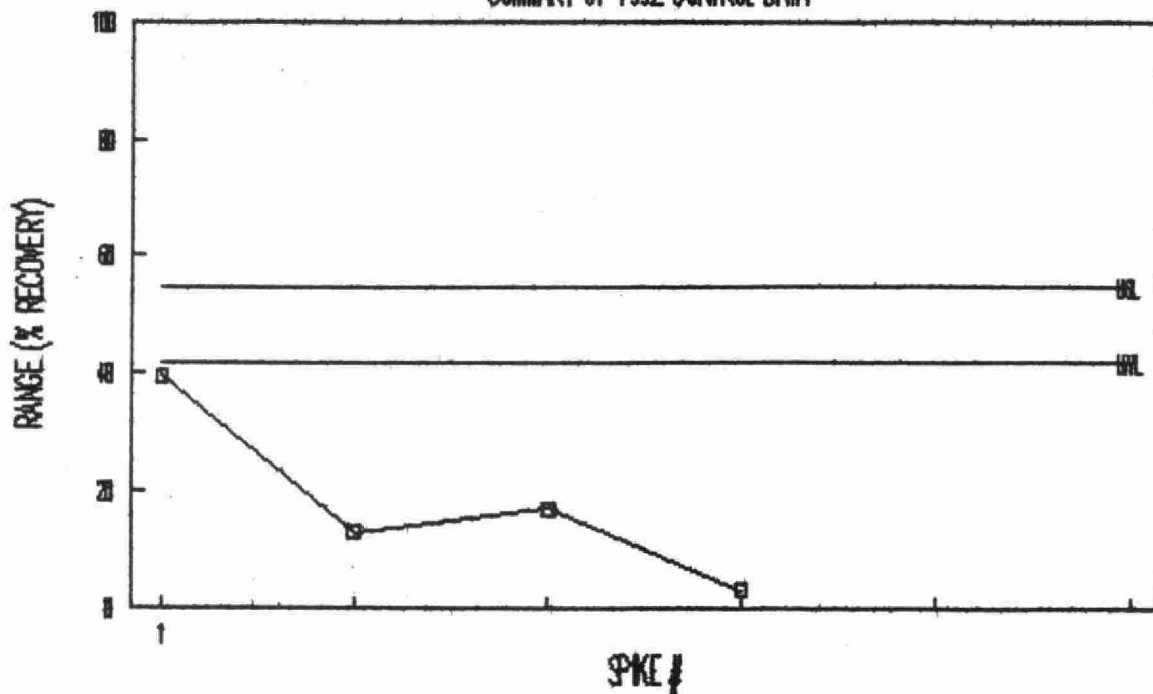
PCBAIR:10CLPH

SUMMARY OF 1992 CONTROL DATA



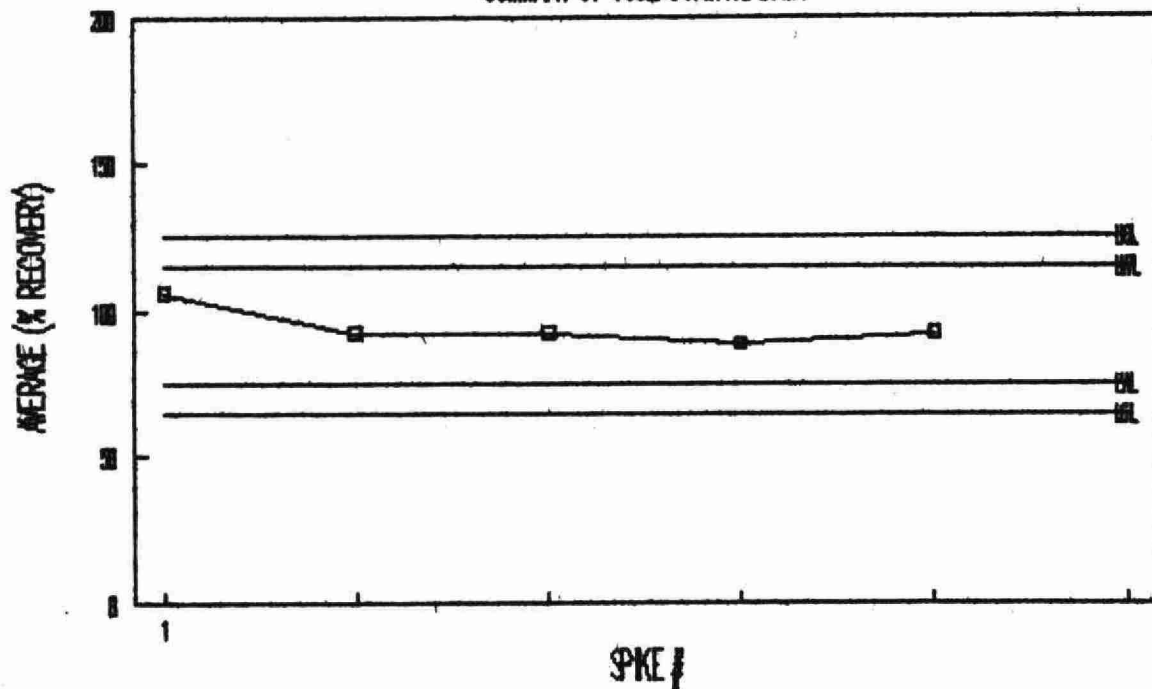
PCBAIR:10CLPH

SUMMARY OF 1992 CONTROL DATA



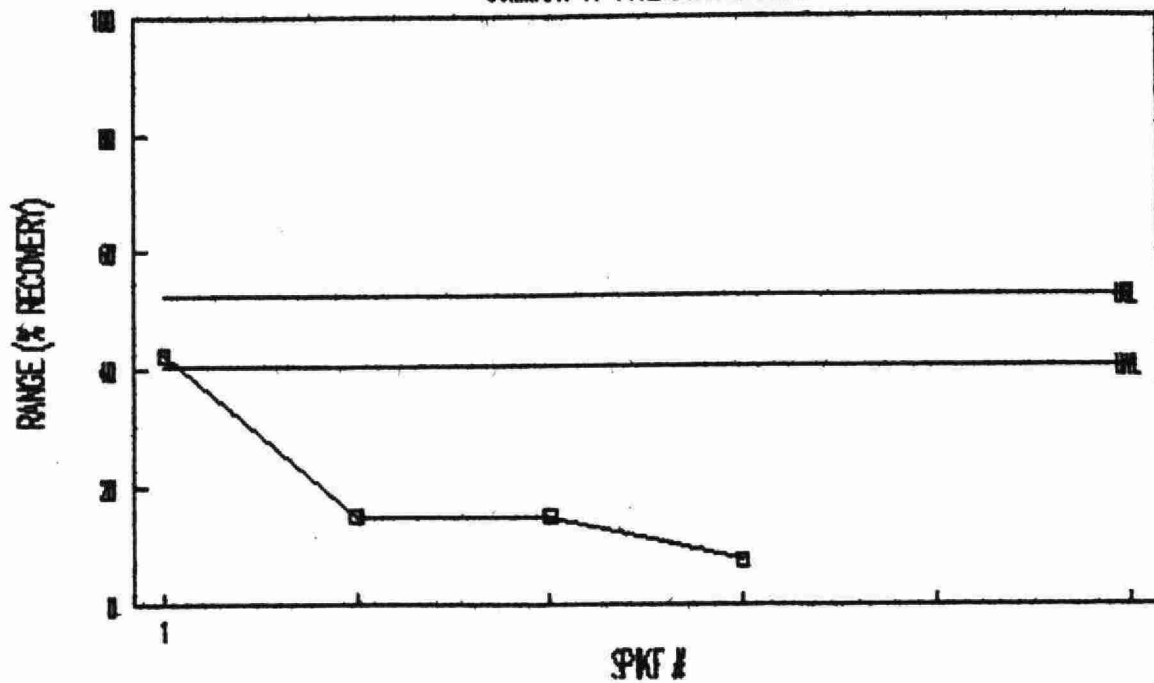
PCBAIR:135TBB

SUMMARY OF 1992 CONTROL DATA



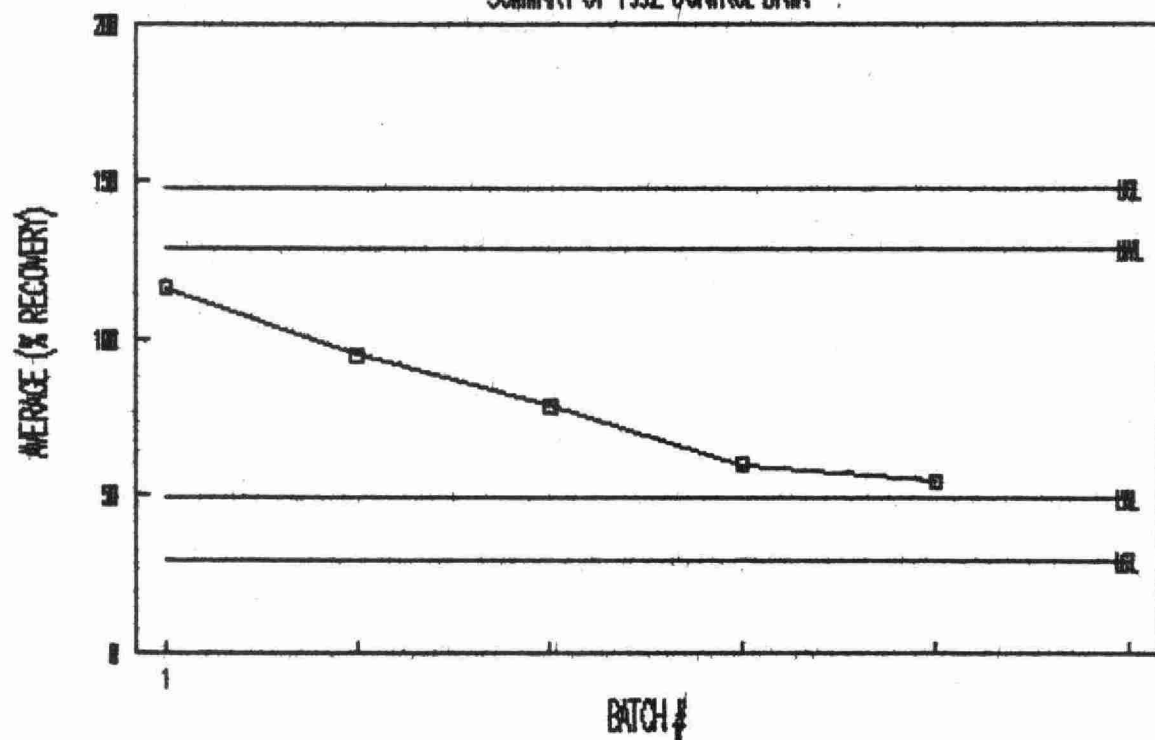
PCBAIR:135TBB

SUMMARY OF 1992 CONTROL DATA



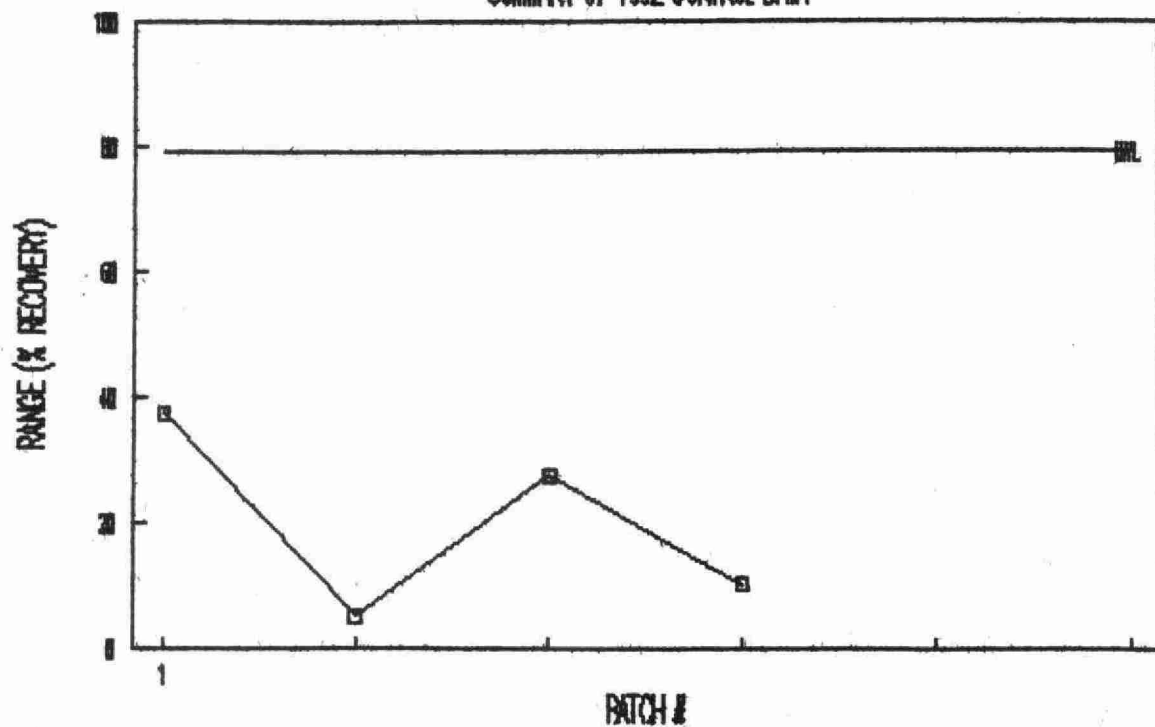
15
PCBAIR:SURR-135TBB (inTB)

SUMMARY OF 1992 CONTROL DATA



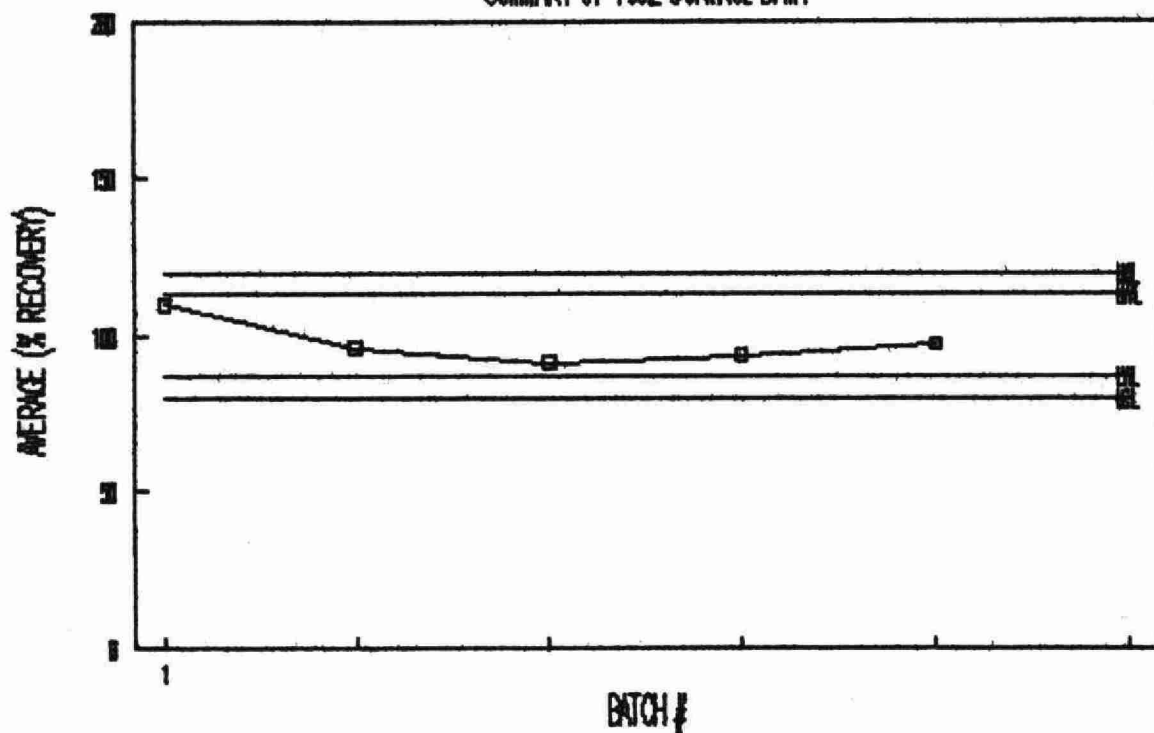
PCBAIR:SURR-135TBB (inTB)

SUMMARY OF 1992 CONTROL DATA



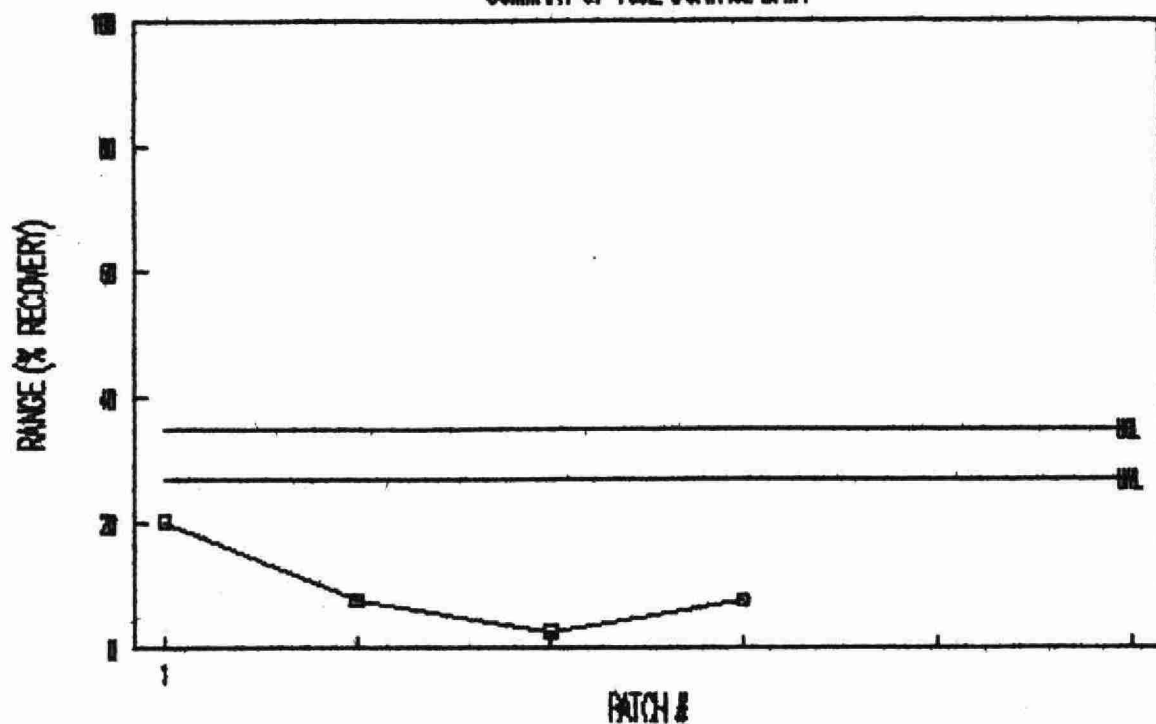
PCBAIR:SURR-135TBB (inFB)

SUMMARY OF 1992 CONTROL DATA



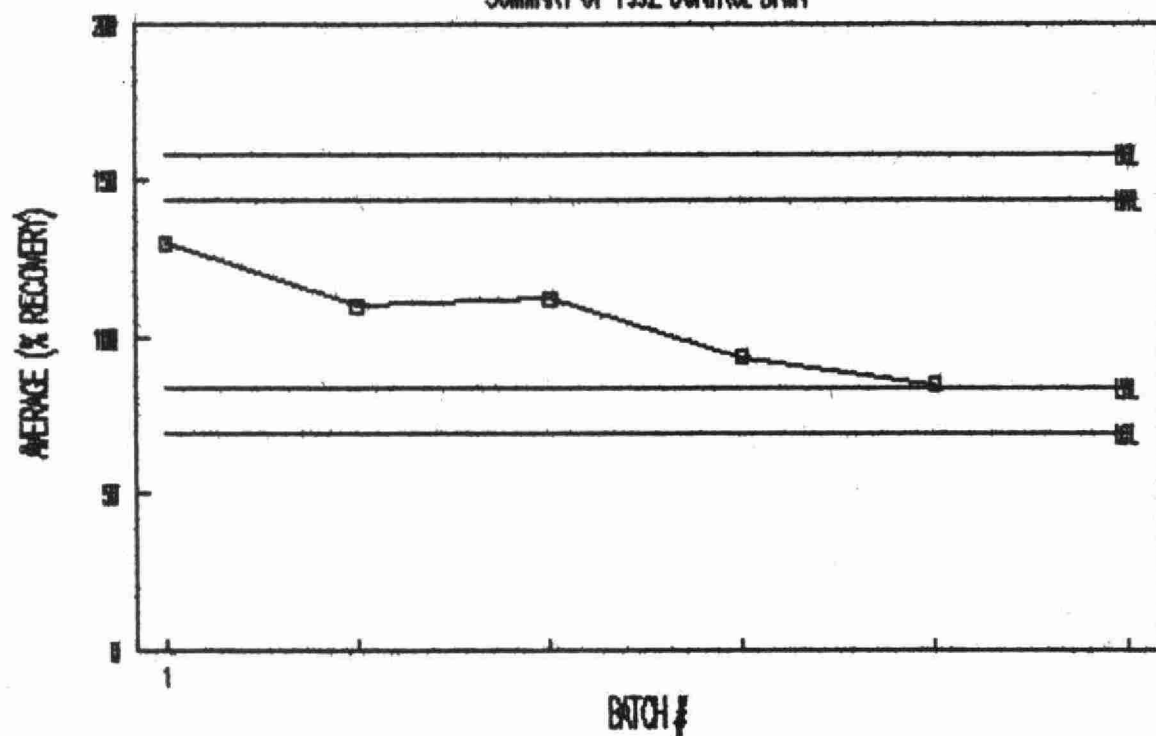
PCBAIR:SURR-135TBB (inFB)

SUMMARY OF 1992 CONTROL DATA



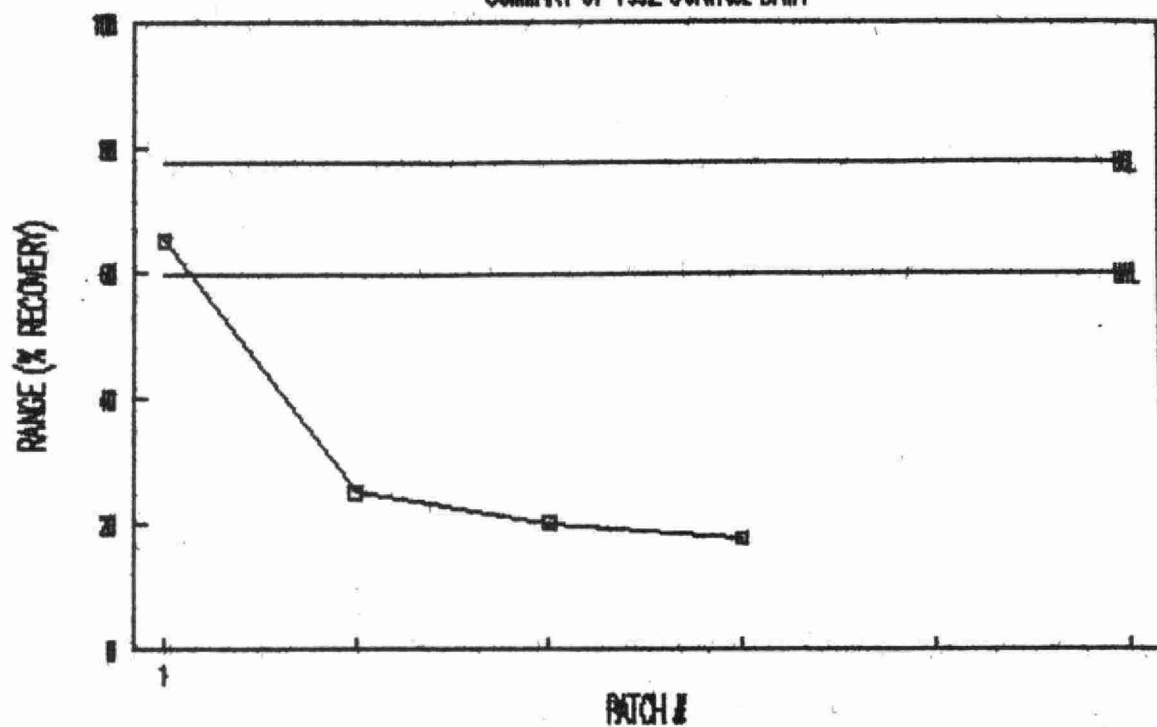
PCBAIR:SURR-135TBB (inSAMPLE)

SUMMARY OF 1992 CONTROL DATA



PCBAIR:SURR-135TBB (inSAMPLE)

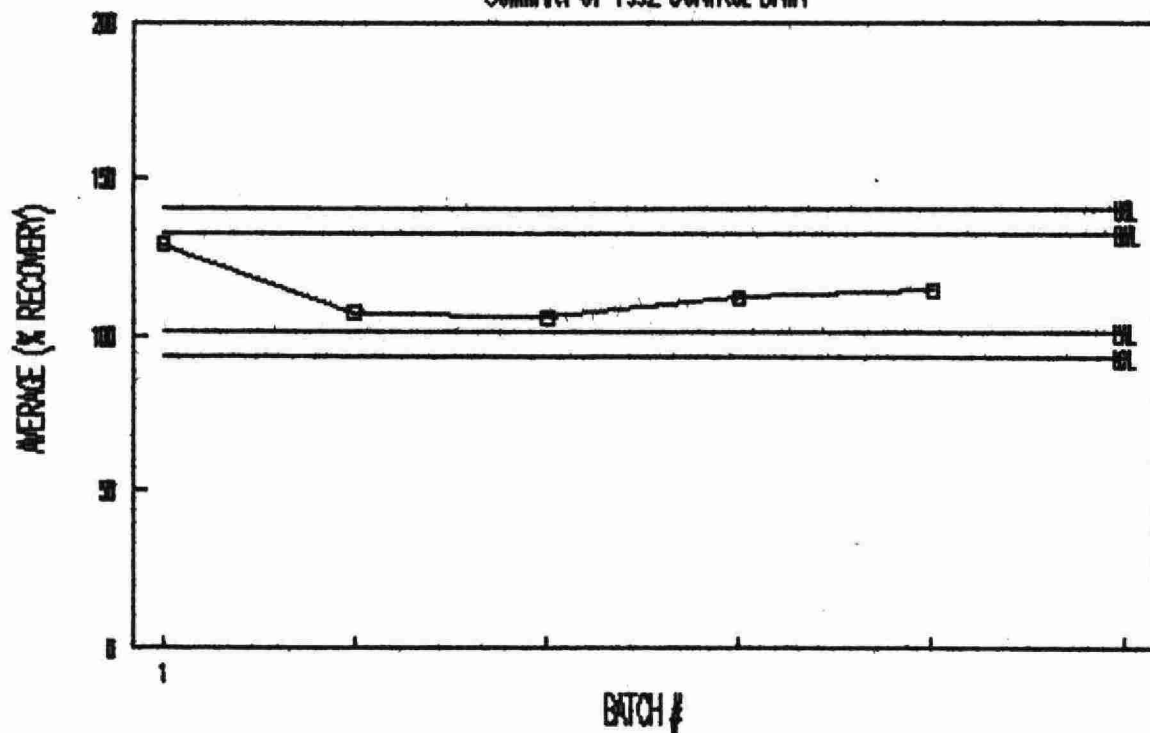
SUMMARY OF 1992 CONTROL DATA



18

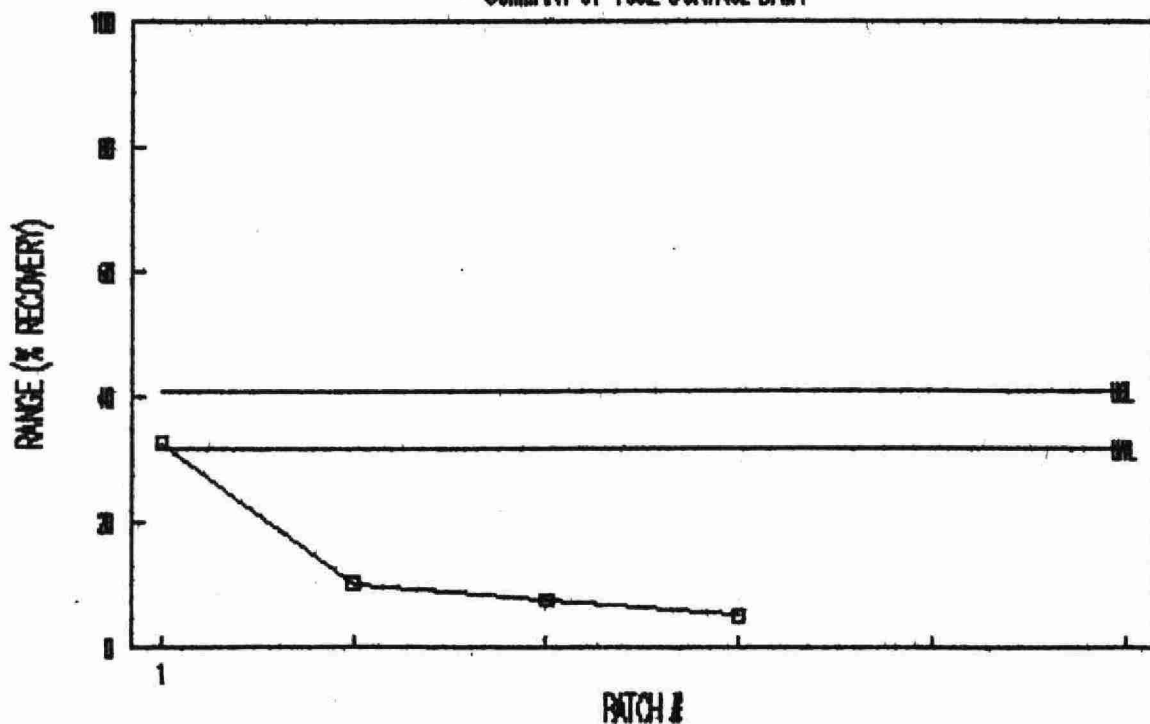
PCBAIR:SURR-135TBB (inSURREF)

SUMMARY OF 1992 CONTROL DATA



PCBAIR:SURR-135TBB (inSURREF)

SUMMARY OF 1992 CONTROL DATA



ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: DESORB E3131A

SAMPLE TYPE: AIR

UNIT: AIR MONITORING

SUPERVISOR: DR. B. FOSTER

PRINCIPLE OF METHOD:

Volatile organic compounds (VOC's) are emitted onto the atmosphere from a variety of sources including industrial and commercial facilities. VOC's are of particular concern due to their complexity and variety of potential toxic effects.

Monitoring of volatile organic compounds in ambient air involves the collection of VOC's on a dual-phase adsorbent cartridge and subsequent analysis by thermal desorption/dual capillary, dual flame ionization detector, gas chromatography. The VOC's are identified and quantified by the comparison of the sample components retention indices to a retention index library. Quantitation of the VOC's is based on a relative response factor approach. The qualitative and quantitative analysis of the VOC's on the two columns of different polarity allows the data to be merged to provide information with a high level of confidence.

PARAMETERS MEASURED:

Butane
Decane
Dodecane
Hexane
Heptane
Nonane
Octane
Pentane
Propane
Undecane

REPORTING RESULTS:

Results are reported in ug/m3.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC sample (alkanes).

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Interferences due to co-elution and peak merging can occur. An important interference in this technique results from condensation of moisture in the cryogenic trap.

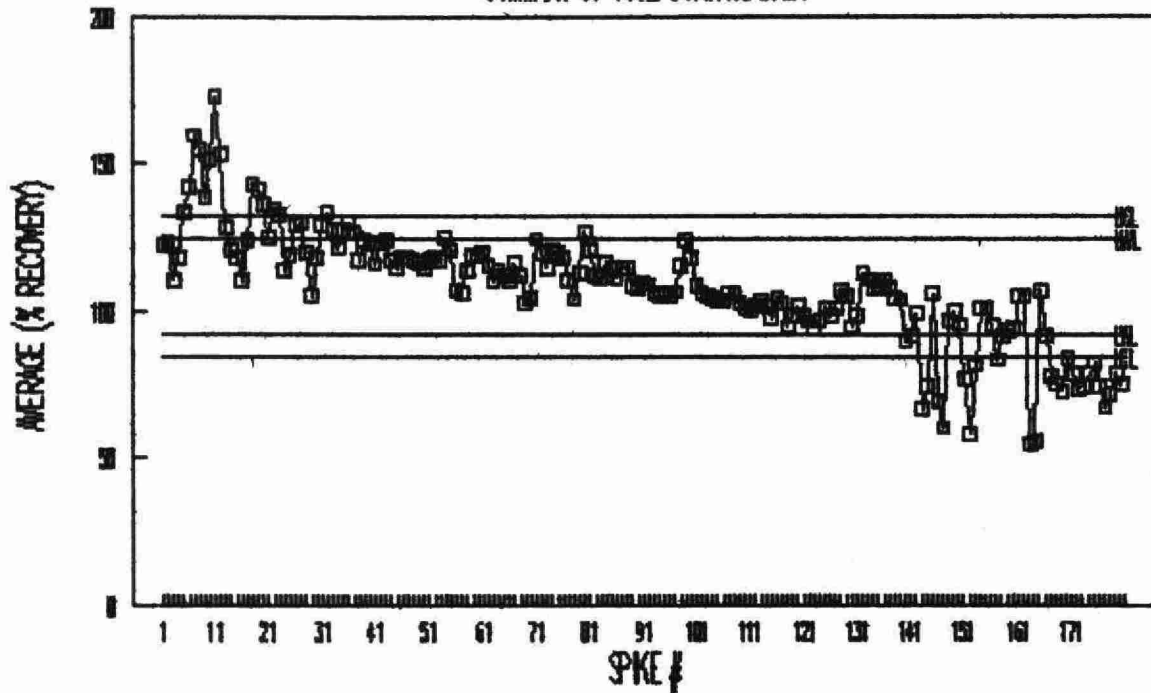
UNIT: AIR MONITORING MATRIX: AIR
 WORKSTATION: DESORB-3131A INSTRUMENT: GC/MSD
 TIME PERIOD: JAN.-DEC.1992 NO. OBSERVATIONS: 180

YEARLY CALCULATION

PARAMETER COMPOUND	CONCENTRATION	AVG. SPK. % REC.	STD. DEV. %REC.	% C.V.
1. PROPANE	: 146	: 108.50	: 21.65	: 19.96
2. BUTANE	: 192	: 106.06	: 14.80	: 13.95
3. PENTANE	: 94	: 99.17	: 15.80	: 15.94
4. HEPTANE	: 103	: 90.20	: 21.54	: 23.88
5. OCTANE	: 105	: 75.13	: 17.18	: 22.86
6. NONANE	: 108	: 58.81	: 15.91	: 27.05
7. DECANE	: 110	: 49.54	: 19.49	: 39.33
8. UNDECANE	: 111	: 32.67	: 17.38	: 53.21
9. DODECANE	: 112	: 13.46	: 6.12	: 45.44

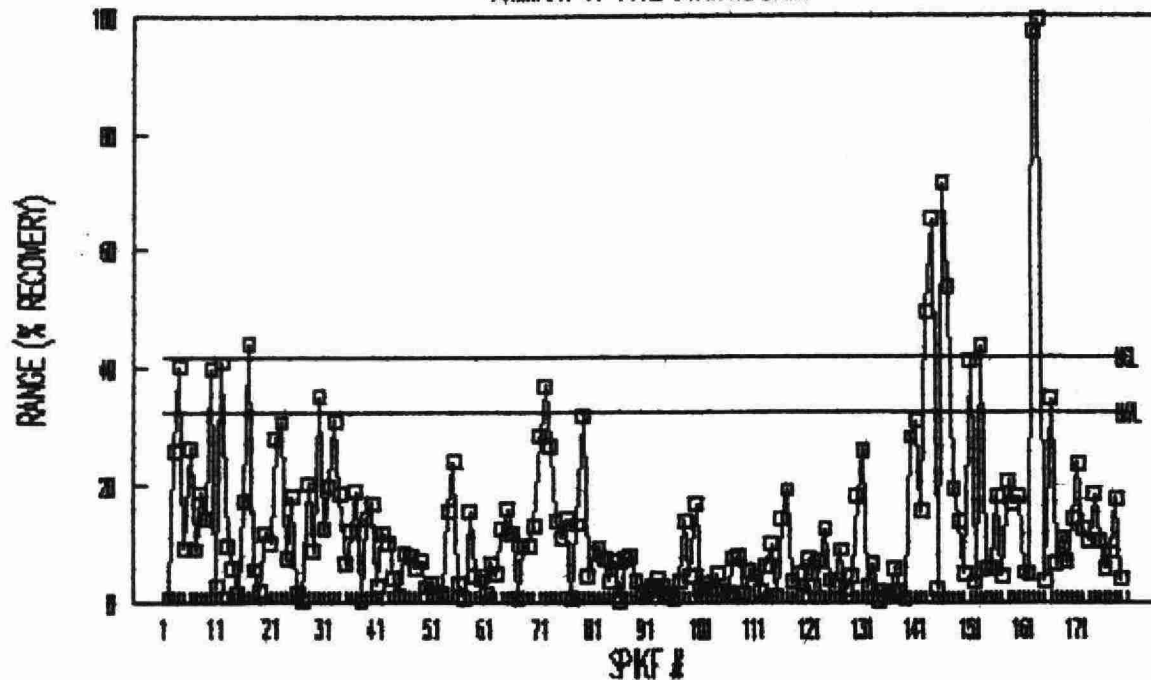
DESORB:PRPANE

SUMMARY OF 1992 CONTROL DATA



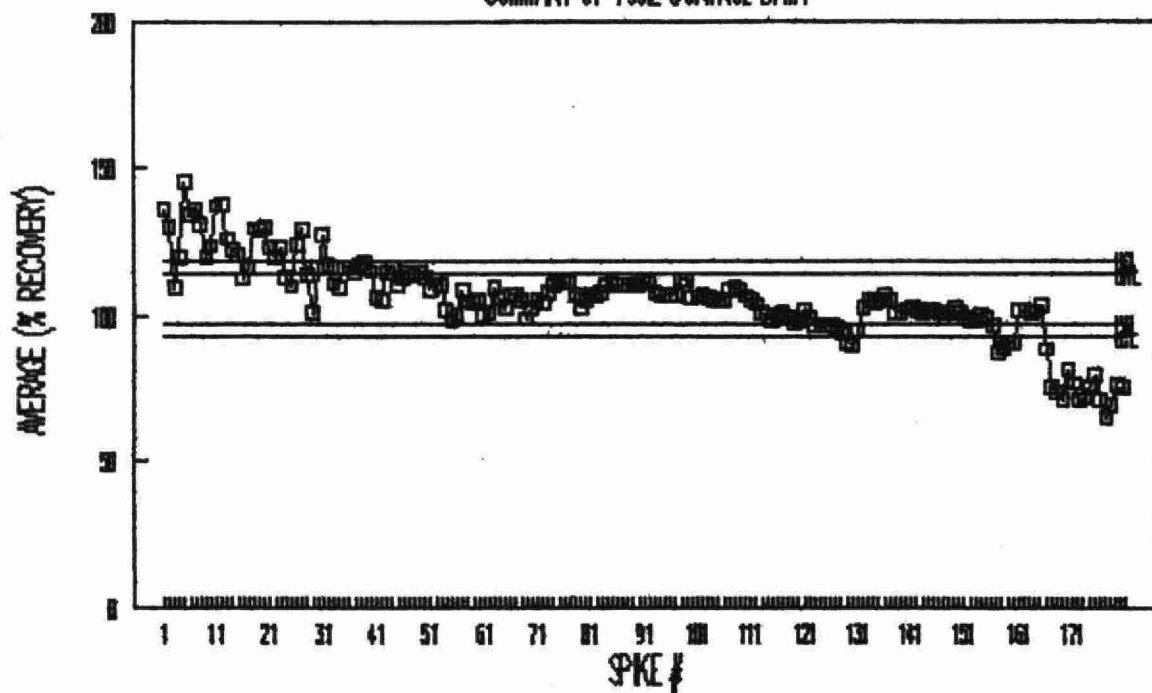
DESORB:PRPANE

SUMMARY OF 1992 CONTROL DATA



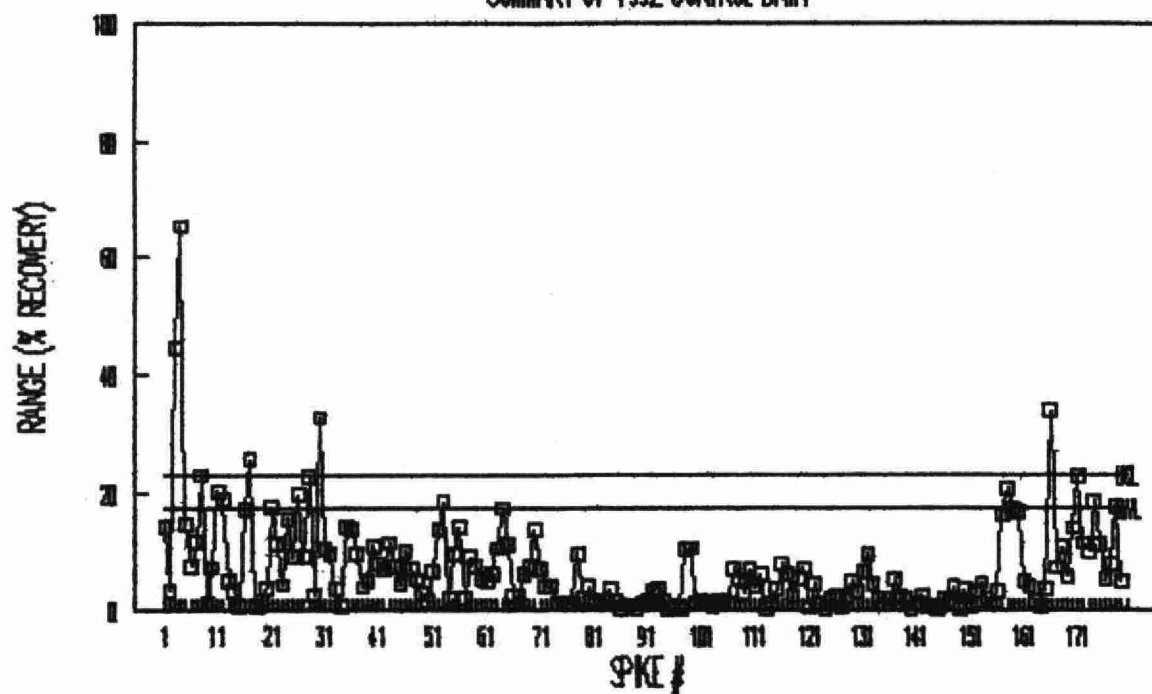
DESORB: BUTANE

SUMMARY OF 1992 CONTROL DATA



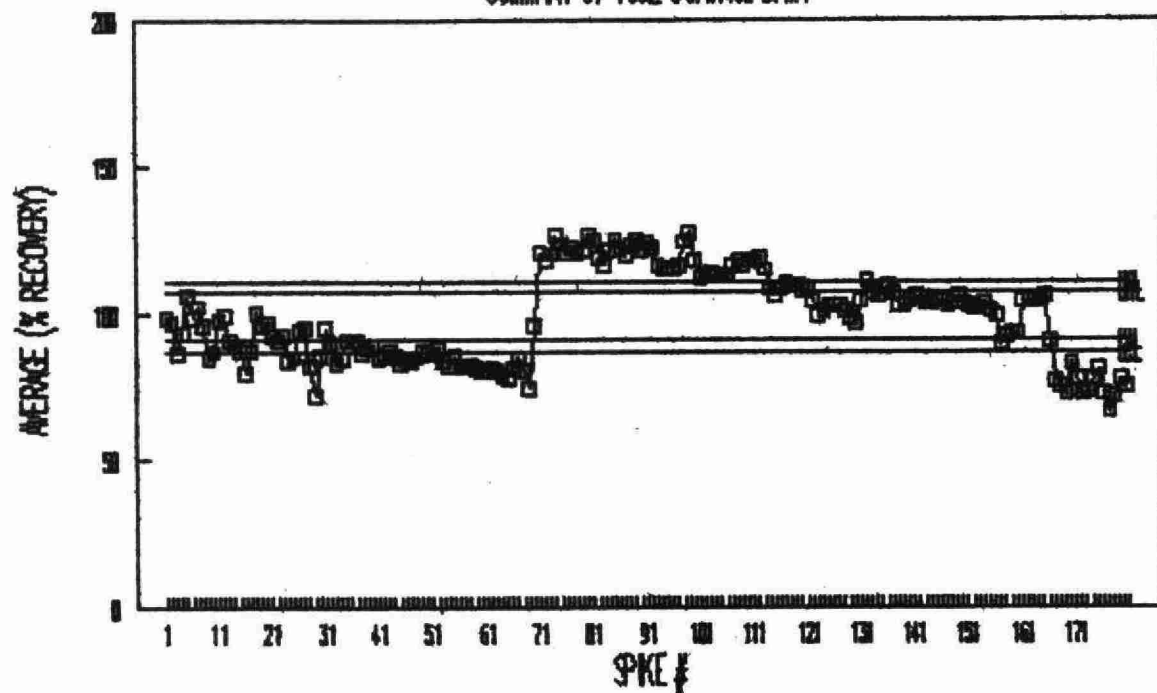
DESORB: BUTANE

SUMMARY OF 1992 CONTROL DATA



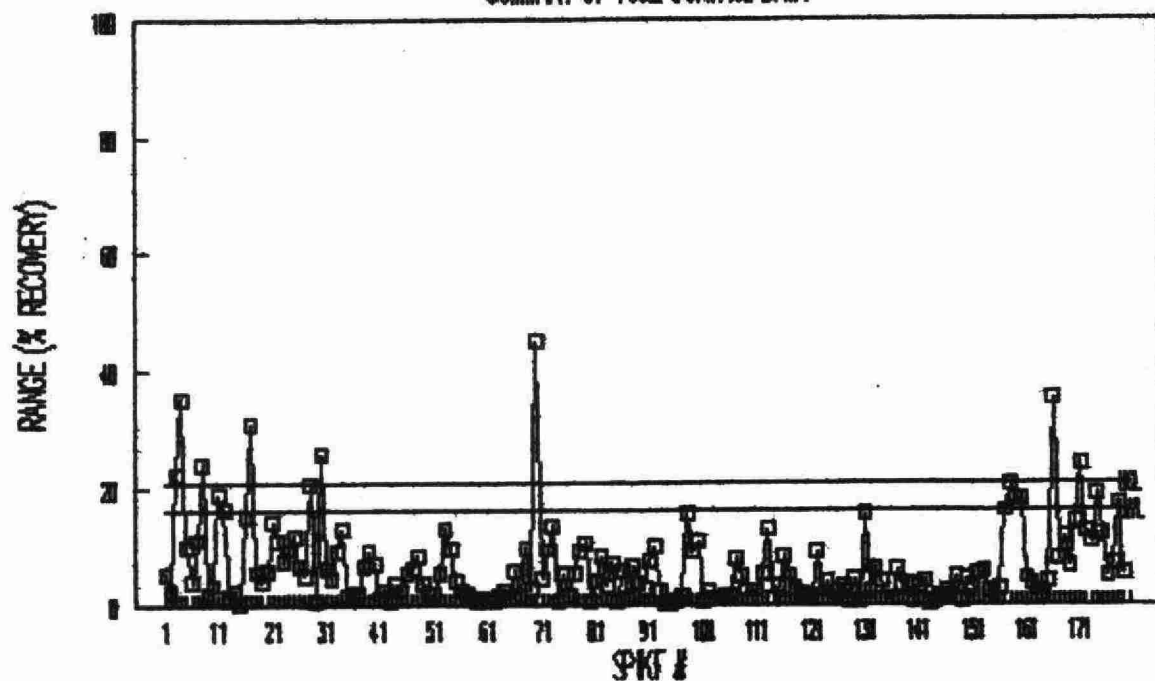
DESORB:PNTANE

SUMMARY OF 1992 CONTROL DATA



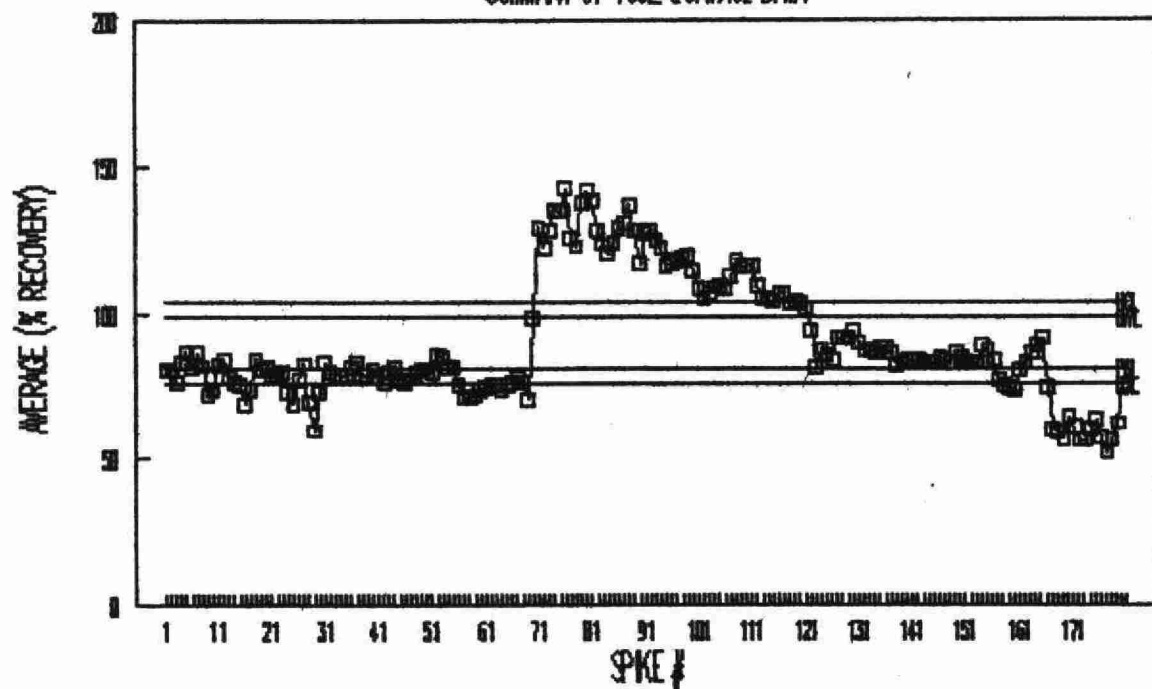
DESORB:PNTANE

SUMMARY OF 1992 CONTROL DATA



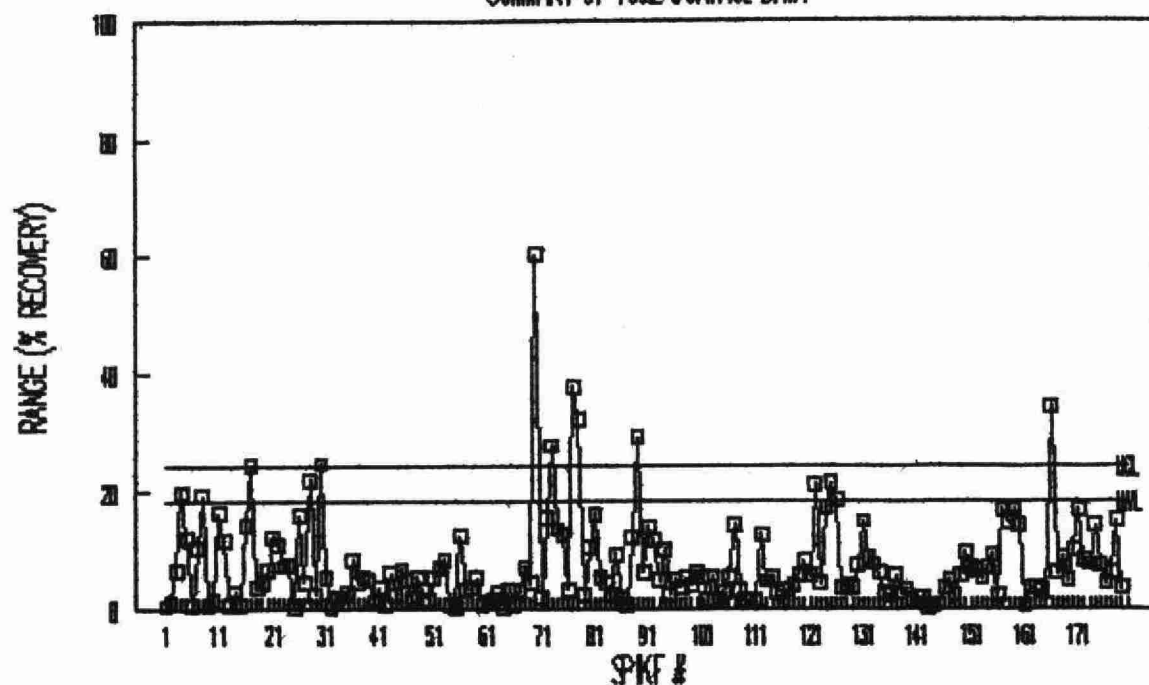
DESORB:HPTANE

SUMMARY OF 1992 CONTROL DATA



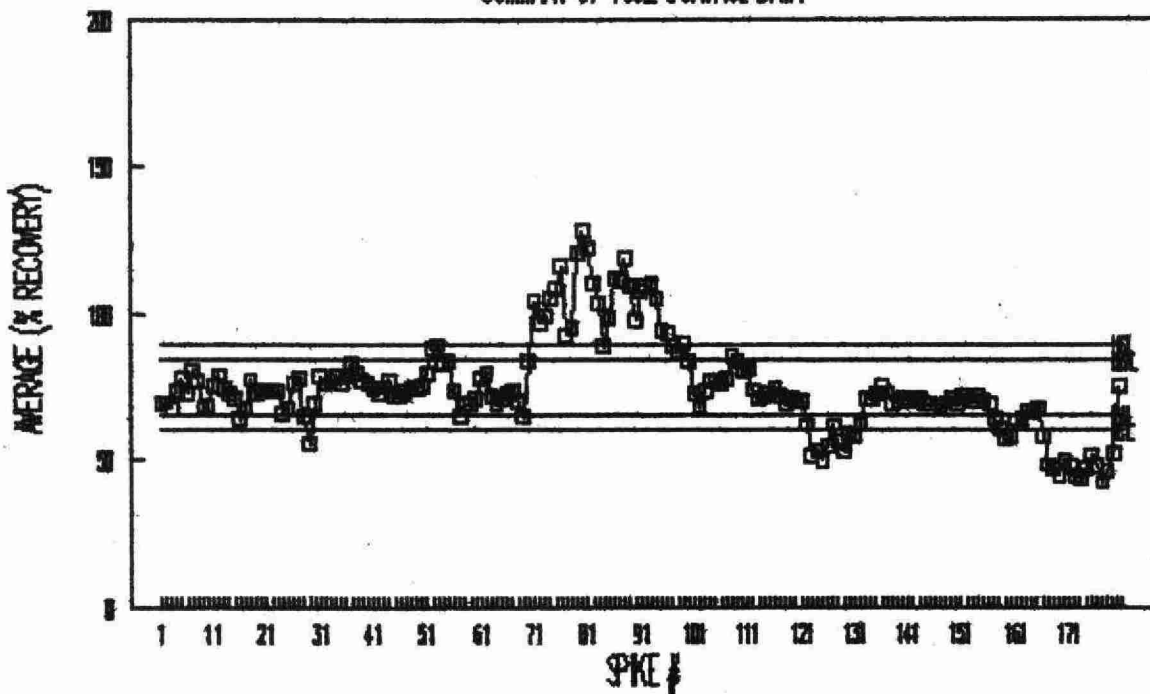
DESORB:HPTANE

SUMMARY OF 1992 CONTROL DATA



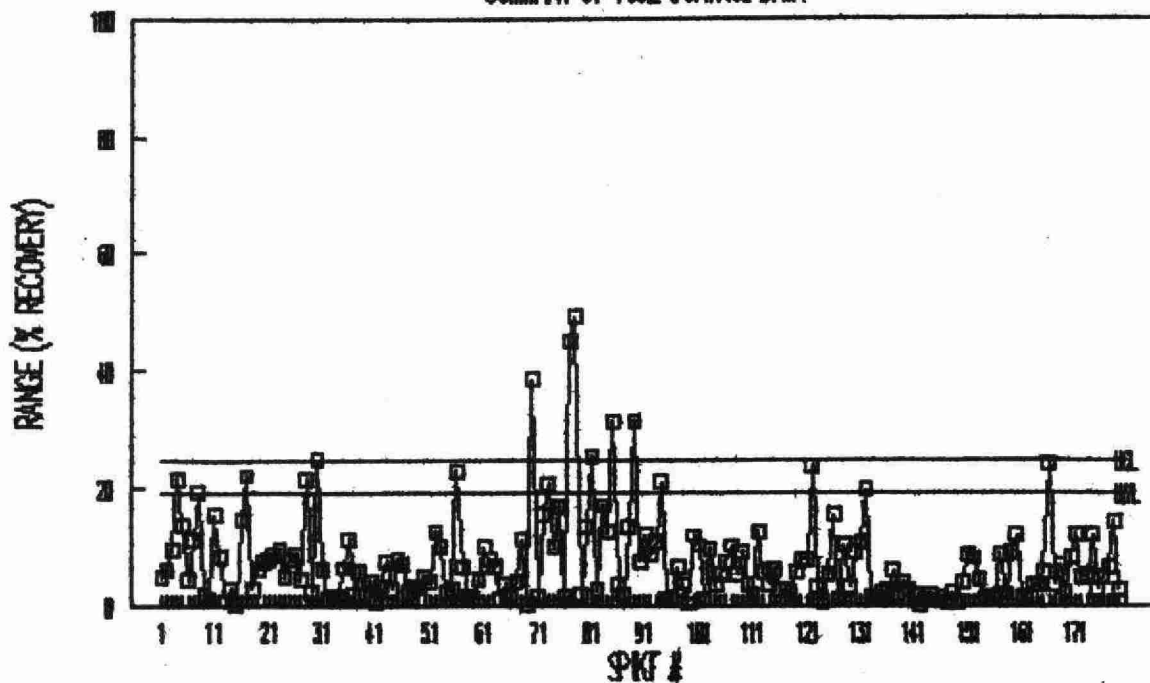
DESORB:OCTANE

SUMMARY OF 1992 CONTROL DATA



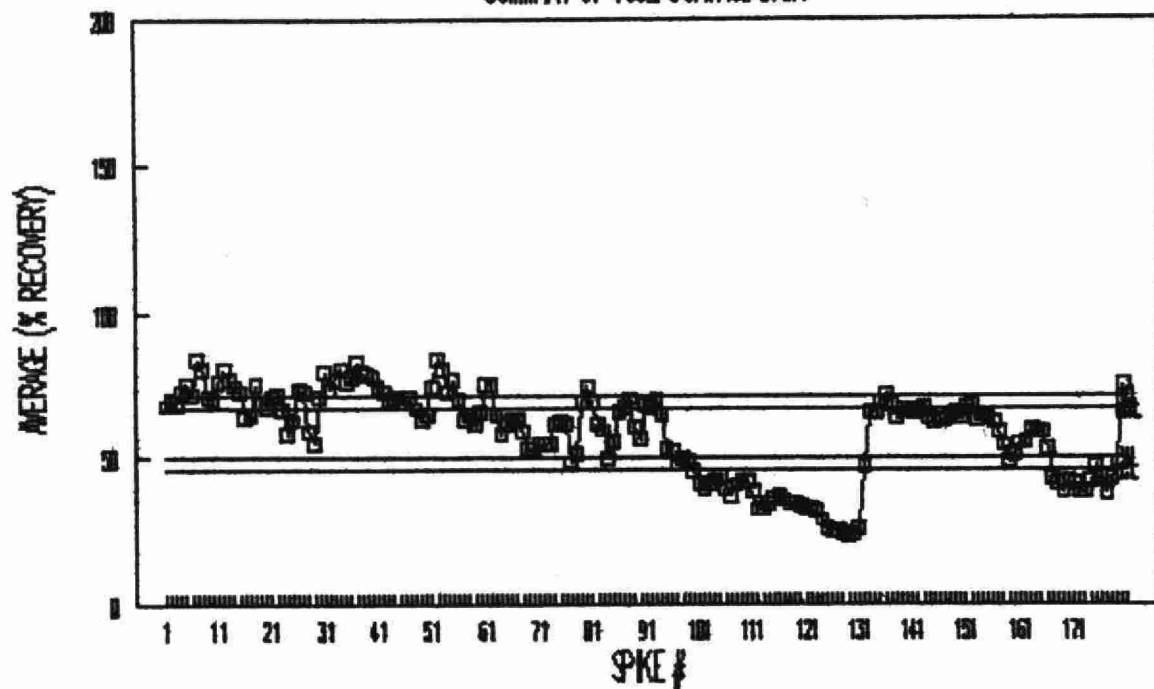
DESORB:OCTANE

SUMMARY OF 1992 CONTROL DATA



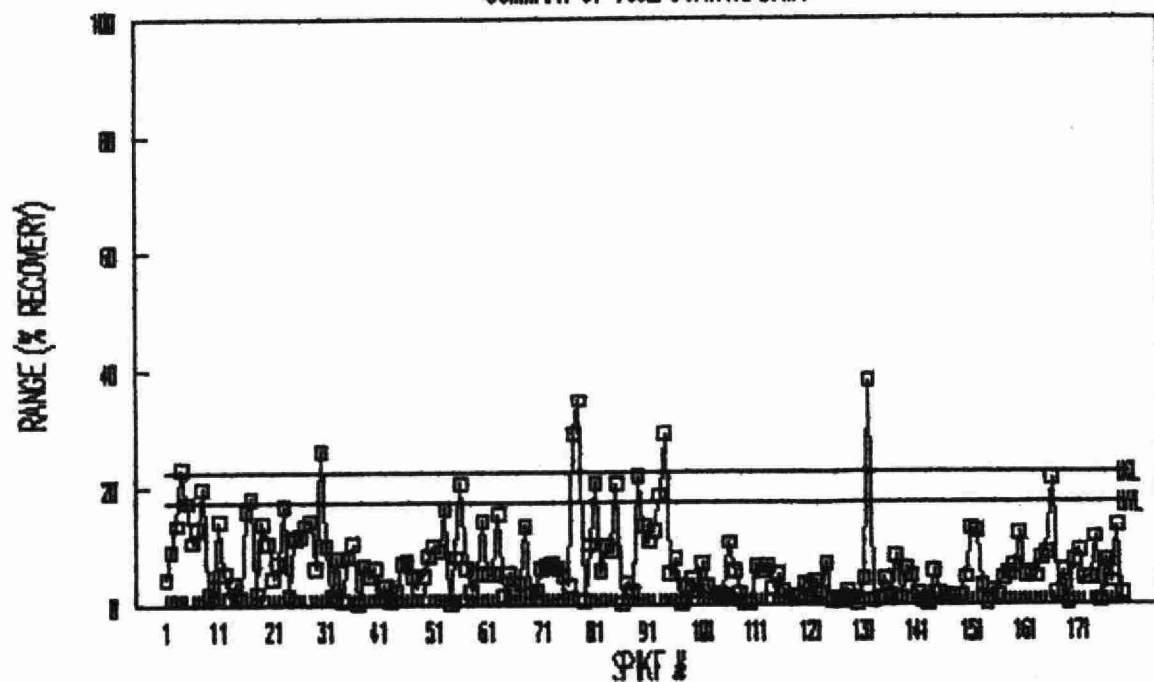
DESORB:NONANE

SUMMARY OF 1992 CONTROL DATA



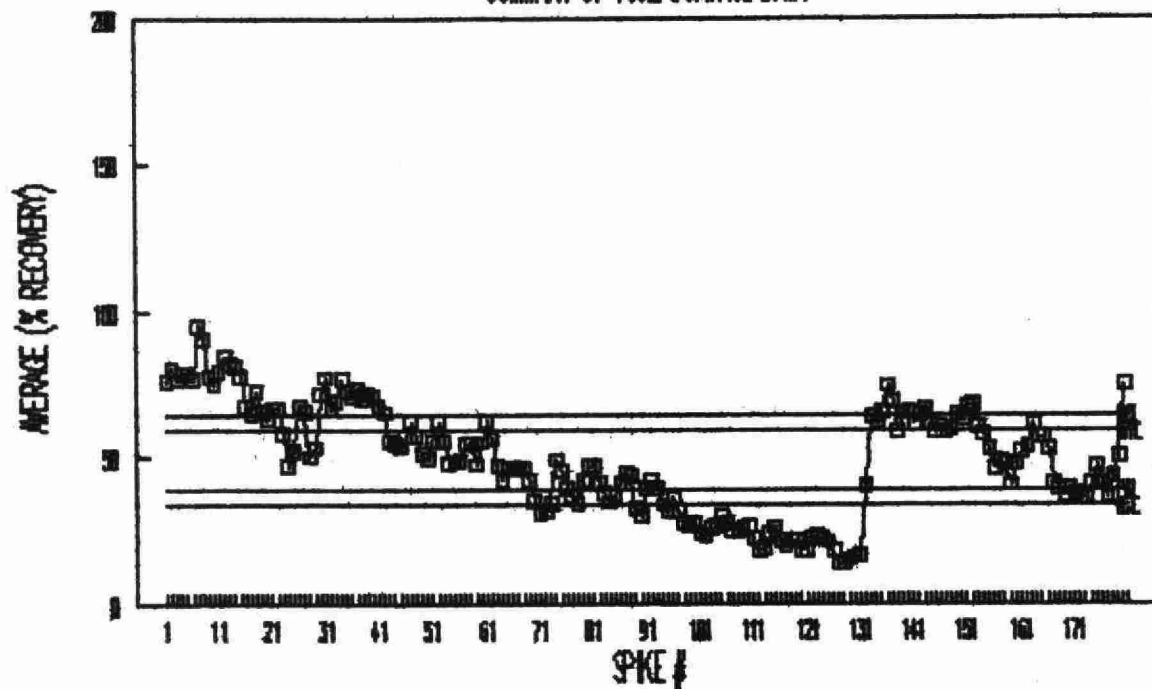
DESORB:NONANE

SUMMARY OF 1992 CONTROL DATA



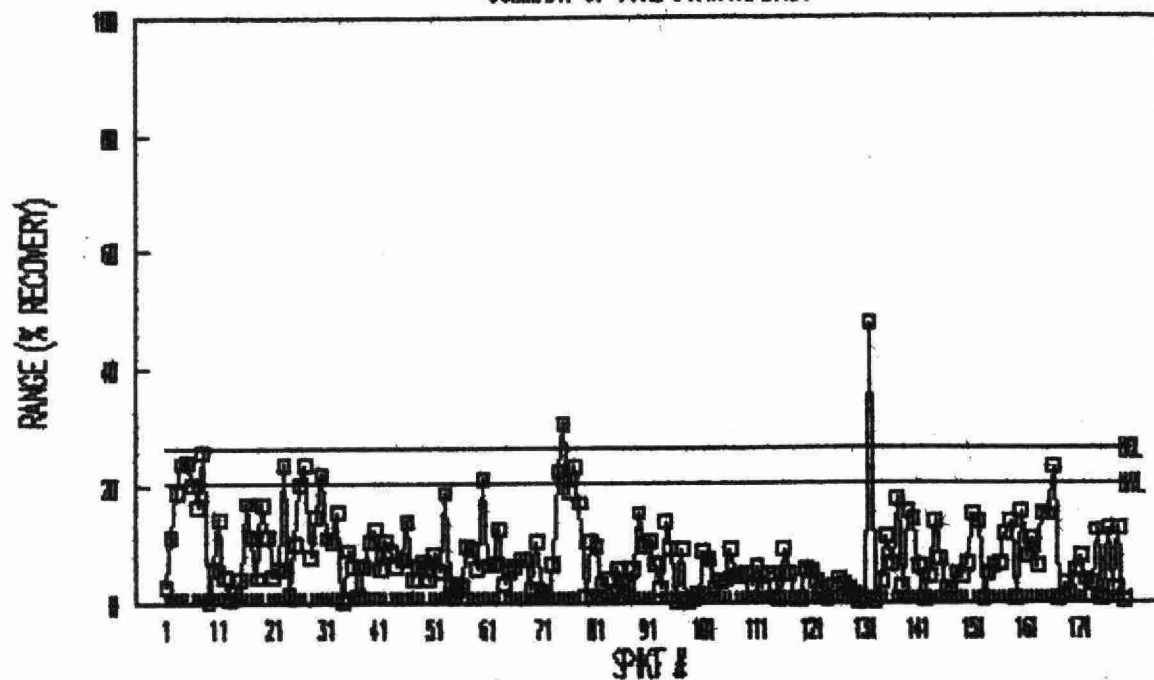
DESORB:DECANE

SUMMARY OF 1992 CONTROL DATA



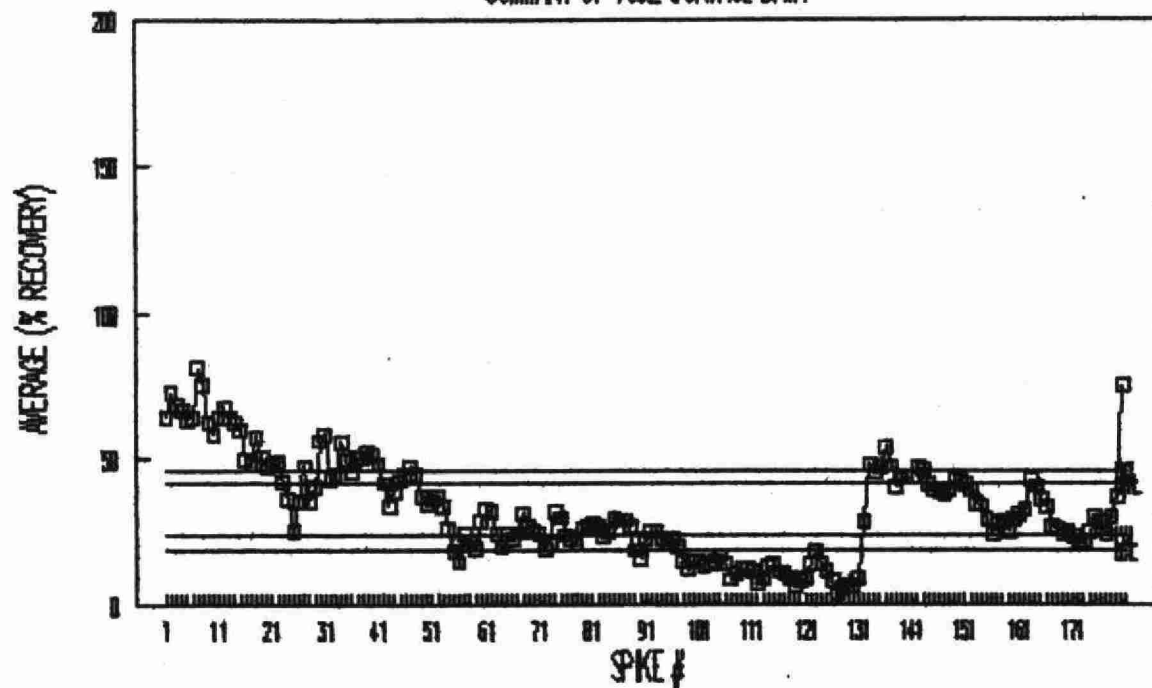
DESORB:DECANE

SUMMARY OF 1992 CONTROL DATA



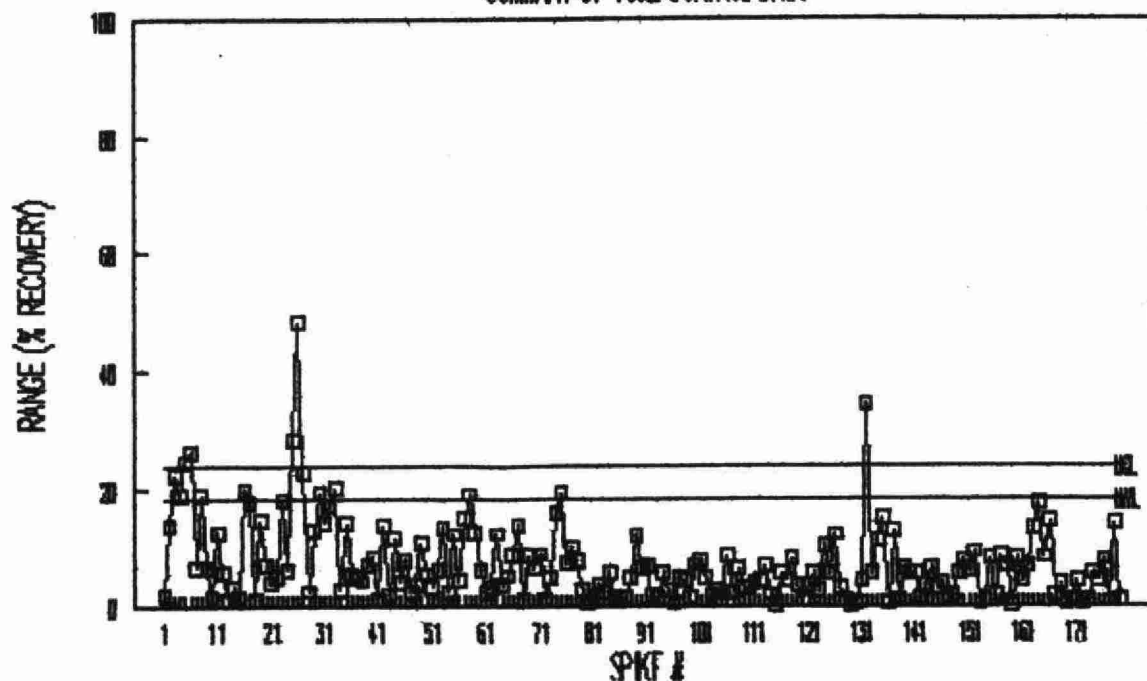
DESORB:UNDECA

SUMMARY OF 1992 CONTROL DATA



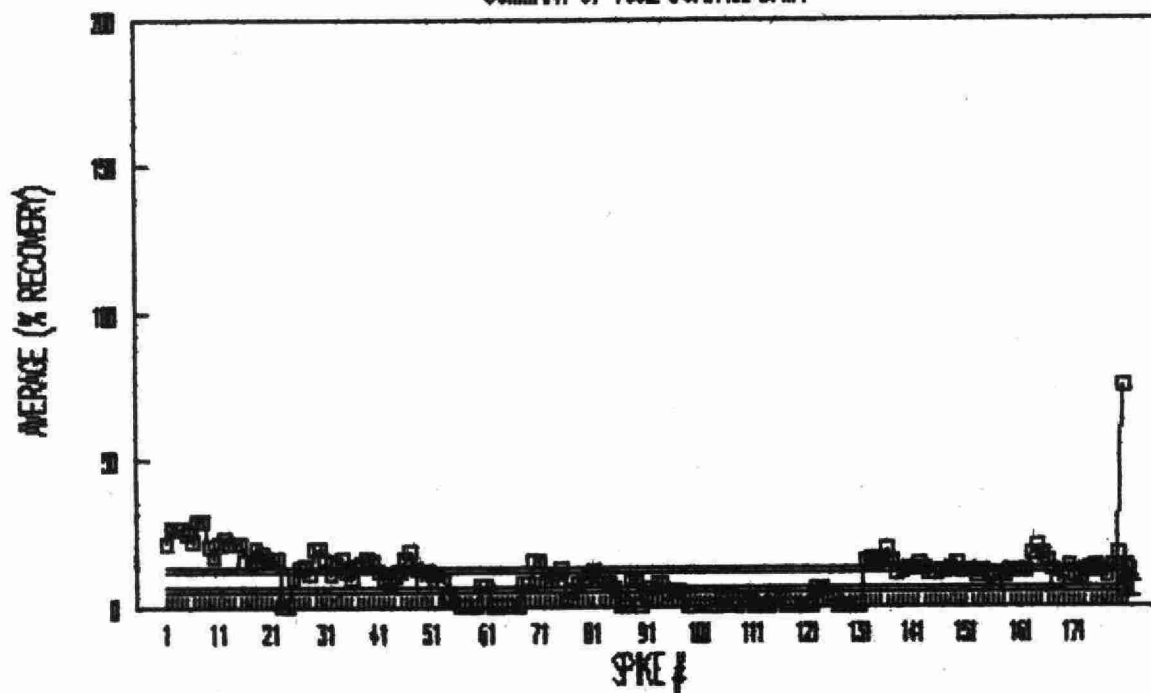
DESORB:UNDECA

SUMMARY OF 1992 CONTROL DATA



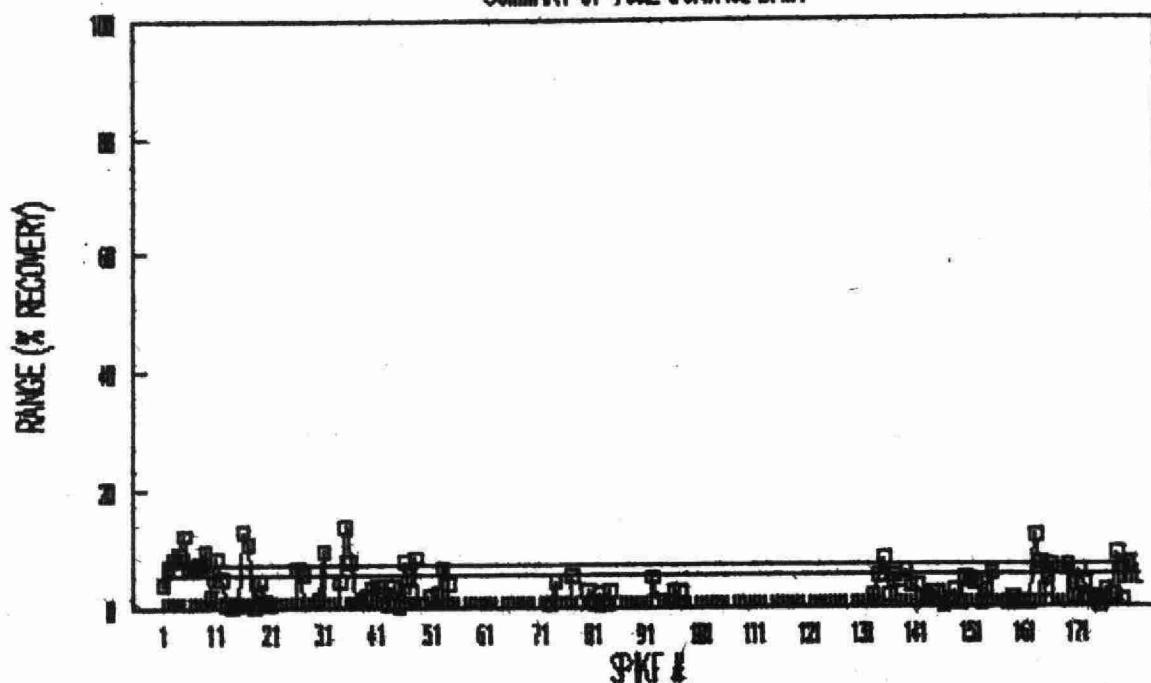
DESORB:DODECA

SUMMARY OF 1992 CONTROL DATA



DESORB:DODECA

SUMMARY OF 1992 CONTROL DATA



BIOTA AND SEDIMENT

Workstation	Method Title	Catalogue No.
PSAOC	The Determination of PCB's /Organo-chlorines Pesticides in Sediment GC-ECD.	E3270A
PSAPA	The Determination of Phenoxy Acids Herbicides/Chlorophenols in Sediment by GC-ECD.	E3201A
PFAOC	The Determination of PCB's/Organo-chlorine Pesticides in Fish by GC-ECD.	E3125A

ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: PSAOC-E3270A

SAMPLE TYPE: SEDIMENT

UNIT: BIOTA & SEDIMENTS

SUPERVISOR: D. TONER

PRINCIPLE OF METHOD

The routine analysis for these compounds involves the use of a gas-liquid chromatograph equipped with electron capture detectors. This instrumental technique is very sensitive to the compounds under test allowing for identification and quantitation at the low (1-20) ppb or ng/g level. However, it is also very non-specific and will react to any compound able to absorb electrons.

Raw sample extracts obtained from soil and sediment samples contain co-extractive materials. In order to eliminate as many of the non-target compounds as possible and still quantitatively analyze those under test, all sample extracts (or a suitable portion) are passed through a selective adsorbent, Florisil.

Florisil, (100-200 mesh), is a fine powdered form of magnesium silicate and when cleaned and temperature-activated, will selectively adsorb organic compounds based on polarity. This property makes it very useful for the clean-up and separation of trace organics for analysis.

An aliquot of the sample final extract is evaporated and applied to a Florisil column. The Florisil is calibrated daily, to allow for changes in its activity and elution volumes required to effect the necessary clean-up and separation. It is a consumable reagent, used once and discarded.

A wet soil (sediment) sample is extracted with acetone using an ultrasonic probe. This procedure extracts the individual soil particles through vigorous agitation in the solvent by the ultrasonic emission of the probe. The acetone extract is then diluted in cold tap water and extracted using dichloromethane. The dichloromethane extracts are combined, dried, evaporated and reconstituted volumetrically for Florisil clean-up and separation prior to analysis by GC-ECD.

All sediments and soils are analyzed in their original wet condition so as not to incur losses of PCB's, organochlorines, and chloroaromatics through a drying procedure. The analytical results are reported on dry basis.

PARAMETERS MEASURED

polychlorinated biphenyls
hexachlorobenzene
Heptachlor
Aldrin
p,p'-DDE
Mirex
 α -hexachlorocyclohexane
 β -hexachlorocyclohexane
 γ -hexachlorocyclohexane
(commonly called LINDANE)
 α -Chlordane
 γ -Chlordane
oxychlordane
o,p'-DDT
p,p'-DDD
p,p'-DDT
Methoxychlor
Heptachlor epoxide
Endosulfan 1
Dieldrin
Endrin
Endosulfan 2
Endosulfan sulphate
Octachlorostyrene
Toxaphene
hexachlorobutadiene
1,2,3-trichlorobenzene
1,2,3,4-tetrachlorobenzene
1,2,3,5-tetrachlorobenzene
1,2,4-trichlorobenzene
1,2,4,5-tetrachlorobenzene
1,3,5-trichlorobenzene
hexachloroethane
pentachlorobenzene
2,3,6-trichlorotoluene
2,4,5-trichlorotoluene
A,2,6-trichlorotoluene

REPORTING RESULTS:

Results are reported in ng/g.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC sample.

PERFORMANCE:

The performance limits are ± 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Raw sample extracts obtained from soil and sediment samples contain co-extractive materials including fats, oils, colouring pigments (carotenes) and a wide range of trace organics not necessarily of interest in this analysis. Interferences also include plasticizers, organic contaminants that may be present in low-grade solvents and chemicals used in the analytical procedure.

ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: PSAPA-E3154A

SAMPLE TYPE: SEDIMENT

UNIT: BIOTA & SEDIMENTS

SUPERVISOR: D. TONER

PRINCIPLE OF METHOD:

Chlorophenols are used in insectidical sprays, as pre-harvest defoliants and general herbicides. Higher chlorinated phenols serve in the preservation of wood, wood products, starches, dextrans and glass. Phenoxyacid herbicides are widely used for selective weed control in crops and roadside vegetation. These material can impart severe taste and odour problems to water supplies at low milligram per liter levels.

The method consists of the following steps:

- a) Moisture determination
- b) Acidification and homogenization of sample.
- c) Extraction and drying with sodium sulphate.
- d) Evaporation in a rotary evaporator/Vortex evaporator.
- e) Derivatization using Diazomethane/Ether Solution.
- f) Florisil clean-up and separation.
- g) Evaporation of the two fractions in a Vortex evaporator.
- h) Mercury treatment of the two fractions.
- i) Analysis using GC-ECD with dual capillary columns.

PARAMETERS MEASURED:

2,4,6-trichlorophenol
2,4,5-trichlorophenol
2,3,4-trichlorophenol
2,3,5,6-tetrachlorophenol
2,3,4,5-tetrachlorophenol
2,3,4,6-tetrachlorophenol
pentachlorophenol
Dicamba
2,4-DP
2,4-D
Silvex
2,4,5-T
2,4-DB

REPORTING RESULTS:

Results are reported in ng/L

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC sample.

PERFORMANCE:

The performance limits are ± 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Due to the low levels being investigated and the relatively non-specific nature of the EC detector, the presence of small amounts of contamination may create serious problems. The EC detector, being non-specific, will respond to other halogenated compounds or other electron-capturing groups.

The polar nature of the solvent used for the chlorophenol and phenoxy acid herbicide fractions, other electron captive compounds may co-elute with the phenoxy-acid herbicides. Although dual capillary column eliminates most identification problems, mis-identification is possible.

This method has been developed for ppb levels of chlorophenols and phenoxyacid herbicides and may need special dilution procedures for some high levels found in sediment or soils near accidental spills.

UNIT: BIOTA & SEDIMENT
 WORKSTATION: PSAOC +PSAPA
 TIME PERIOD: 1992

MATRIX: SED.
 INSTRUMENT: GC
 NO. OBSERVATIONS: OC's 90
 CB's 48

YEARLY CALCULATION

PARAMETER COMPOUND	CONCENTRATION	AVG. SPK. % REC.	STD. DEV. % REC.	% C.V.
1. PCB	: 1000	: 92	: 17	: 19
2. HCB	: 10	: 84	: 23	: 27
3. HEPT	: 40	: 87	: 18	: 21
4. ALDRIN	: 40	: 96	: 33	: 34
5. PP'DDE	: 40	: 115	: 32	: 28
6. MIREX	: 100	: 105	: 27	: 25
7. A BHC	: 40	: 82	: 23	: 29
8. G BHC	: 40	: 84	: 14	: 17
9. B BHC	: 40	: 89	: 20	: 22
10.A CHLOR	: 40	: 88	: 20	: 23
11.G CHLOR	: 40	: 93	: 20	: 22
12.OXYCHL	: 40	: 88	: 22	: 25
13.OP'DDT	: 100	: 84	: 51	: 60
14.PP'DDD	: 80	: 83	: 17	: 21
15.PP'DDT	: 100	: 67	: 24	: 36
16.DMDT	: 200	: 91	: 26	: 29
17.H.EPOX	: 100	: 94	: 26	: 28
18.ENDOS 1	: 40	: 95	: 25	: 26
19.DIELDRIN	: 80	: 91	: 18	: 20
20.ENDRIN	: 80	: 106	: 40	: 38

UNIT: BIOTA & SED.
 WORKSTATION: PSAOC +PSAPA
 TIME PERIOD: 1992

MATRIX: SED.
 INSTRUMENT: GC
 NO. OBSERVATIONS: 90 OC's
 48 CB's

YEARLY CALCULATION

PARAMETER COMPOUND	SPIKE NG/G	AVG. SPK. % REC.	STD. DEV. % REC.	% C.V.
21. ENDOS 2	: 80	: 86	: 20	: 23
22. ENDOS SS	: 80	: 83	: 23	: 28
23. OCSTYR	: 20	: 87	: 24	: 28
24. PCB209*	: 45	: 101	: 14	: 14
25. DBCDT *	: 100	: 82	: 22	: 27
26. HCBD	: 20	: 62	: 19	: 30
27. 123TCB	: 20	: 77	: 22	: 28
28. 1234TCB	: 20	: 76	: 17	: 22
29. 1235TCB	: 20	: 76	: 17	: 23
30. 124TCB	: 10	: 101	: 33	: 32
31. 1245TCB	: 20	: 75	: 17	: 23
32. 135TCB	: 20	: 76	: 22	: 29
33. HCE	: 20	: 59	: 17	: 28
34. PNCB	: 20	: 77	: 16	: 21
35. 236TCT	: 20	: 75	: 22	: 30
36. 245TCT	: 20	: 81	: 22	: 28
37. 26ACT	: 20	: 72	: 20	: 27
38. 135TBB	: 20	: 81	: 14	: 18

UNIT: BIOTA & SED. MATRIX: SEDIMENT
 WORKSTATION: PSAPA INSTRUMENT: GC
 TIME PERIOD: JAN.-DEC.1992 NO. OBSERVATIONS: 31

YEARLY CALCULATION

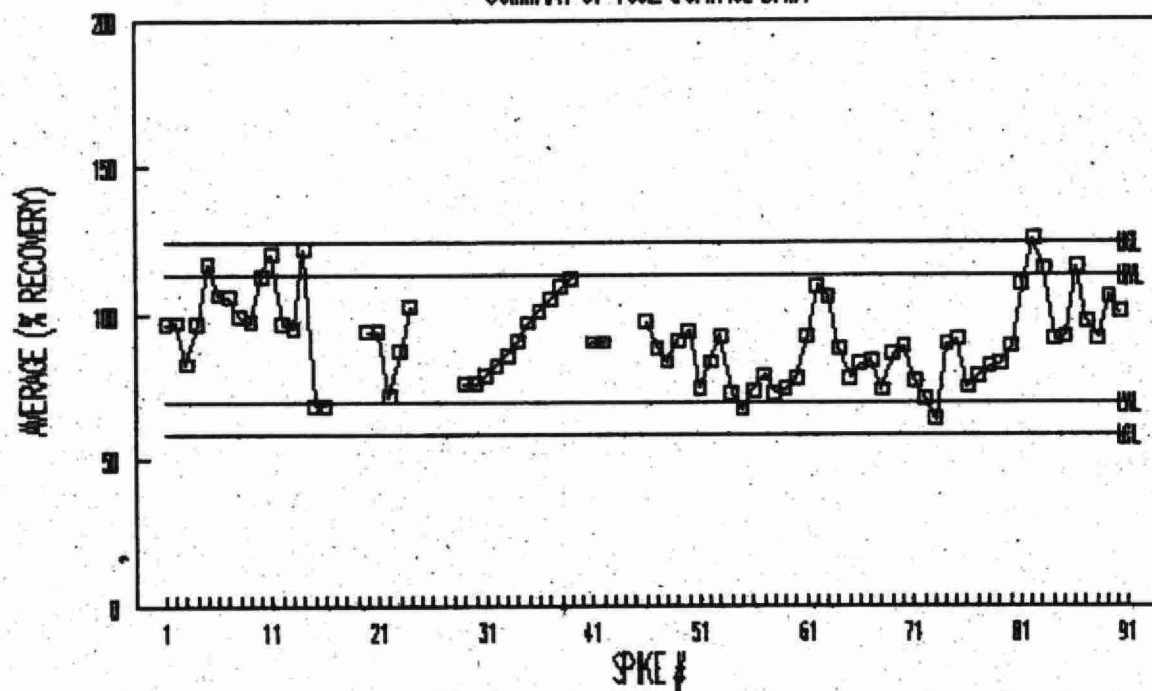
PARAMETER COMPOUND	SPIKE NG/G	AVG. SPK. % REC.	STD. DEV. % REC.	%C.V.
1. 234TCP	: 60	: 78	: 23	: 29
2. 2345TCP	: 40	: 90	: 20	: 22
3. 2356TCP	: 40	: 71	: 15	: 21
4. 245TCP	: 120	: 83	: 16	: 19
5. 246TCP	: 40	: 72	: 17	: 24
6. PCPH	: 20	: 98	: 27	: 28
7. 246TBP*	: 50	: 78	: 24	: 31

SURROGATES IN SAMPLES NO. OBSERVATIONS 43

1. PCB209	: 45	: 81.31	: 11.2	: 13.78
2. DBCDT	: 100	: 71.06	: 21.21	: 29.84
3. 135TBB	: 20	: 83.04	: 19.01	: 22.89
4. 246TBP	: 50	: 84.33	: 12.41	: 14.71

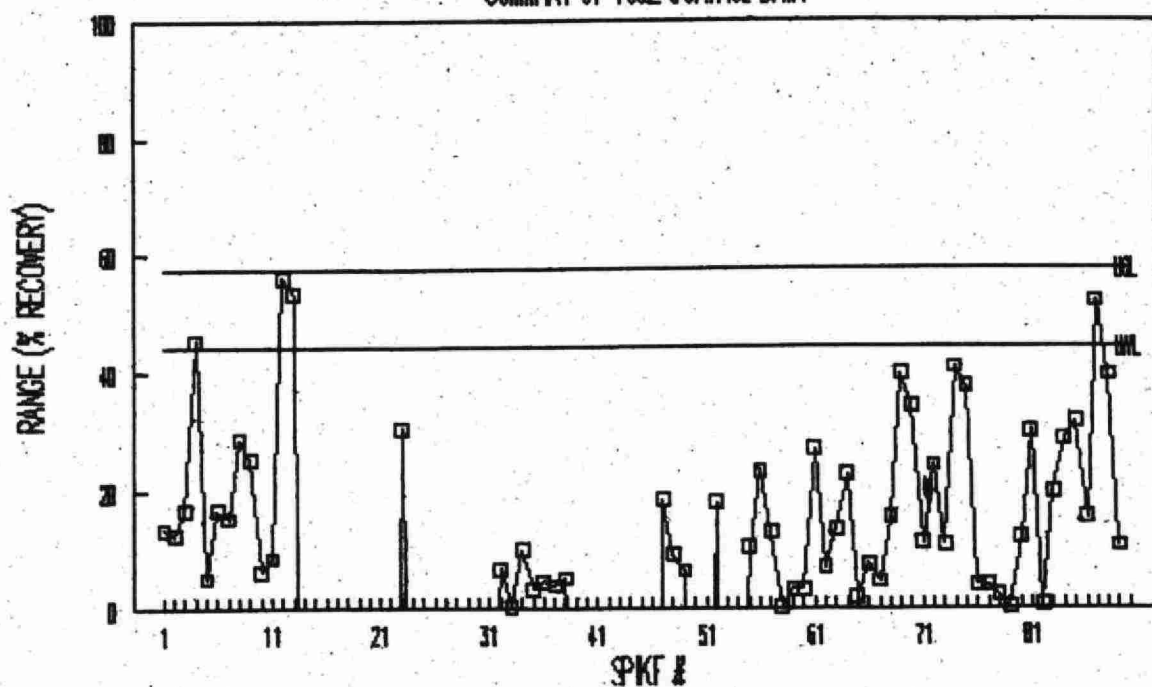
PSAOC: PCB

SUMMARY OF 1992 CONTROL DATA



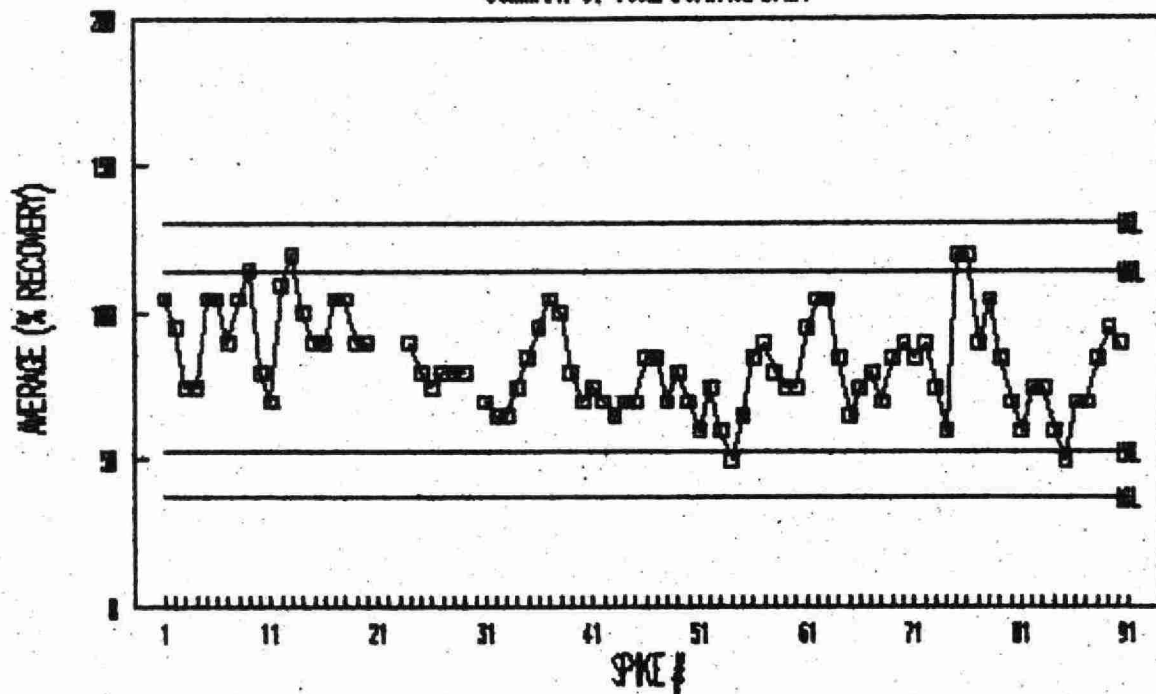
PSAOC: PCB

SUMMARY OF 1992 CONTROL DATA



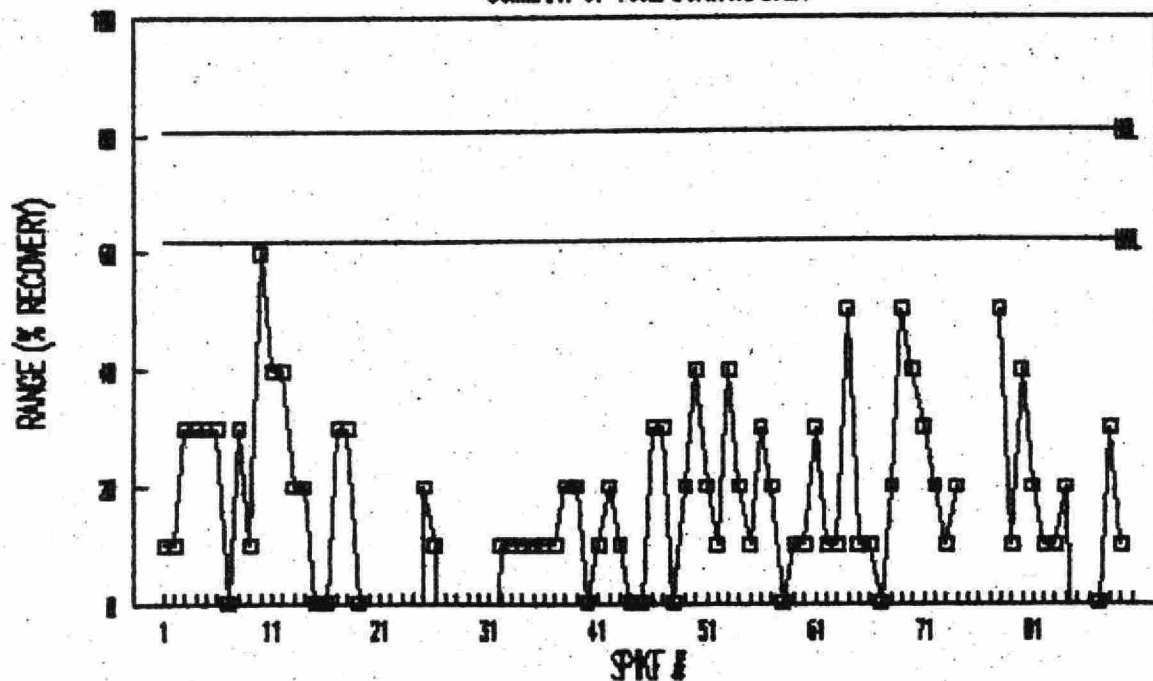
PSAOC: HCB

SUMMARY OF 1992 CONTROL DATA



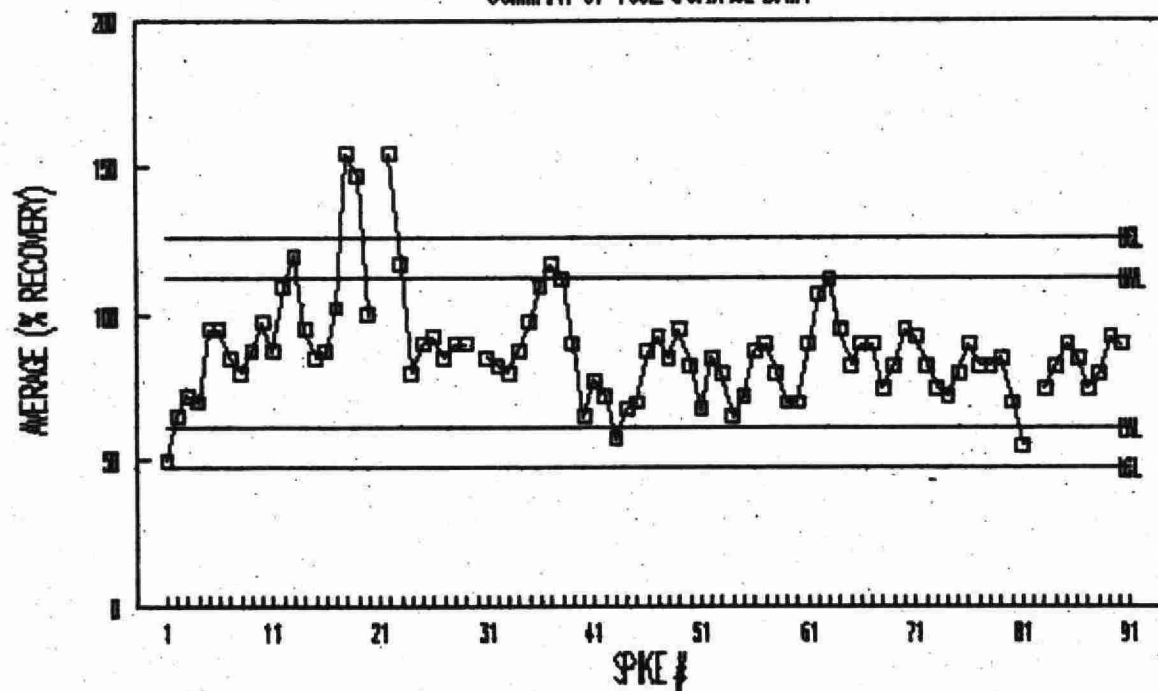
PSAOC: HCB

SUMMARY OF 1992 CONTROL DATA



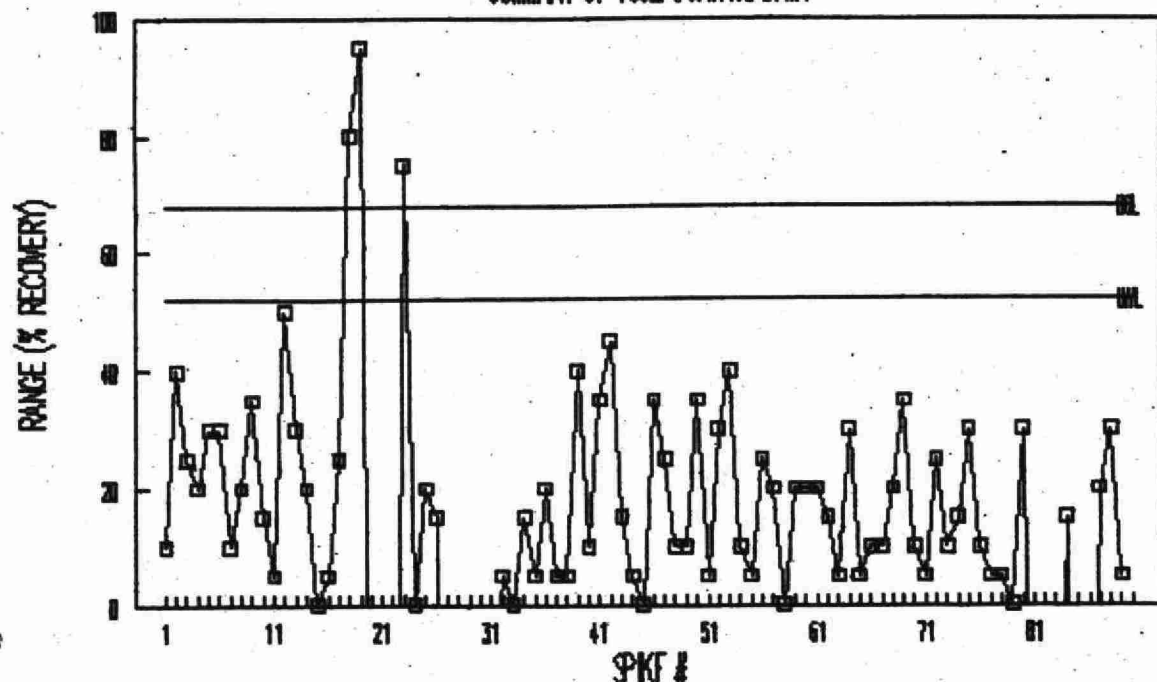
PSAOC: OCSTYR

SUMMARY OF 1992 CONTROL DATA



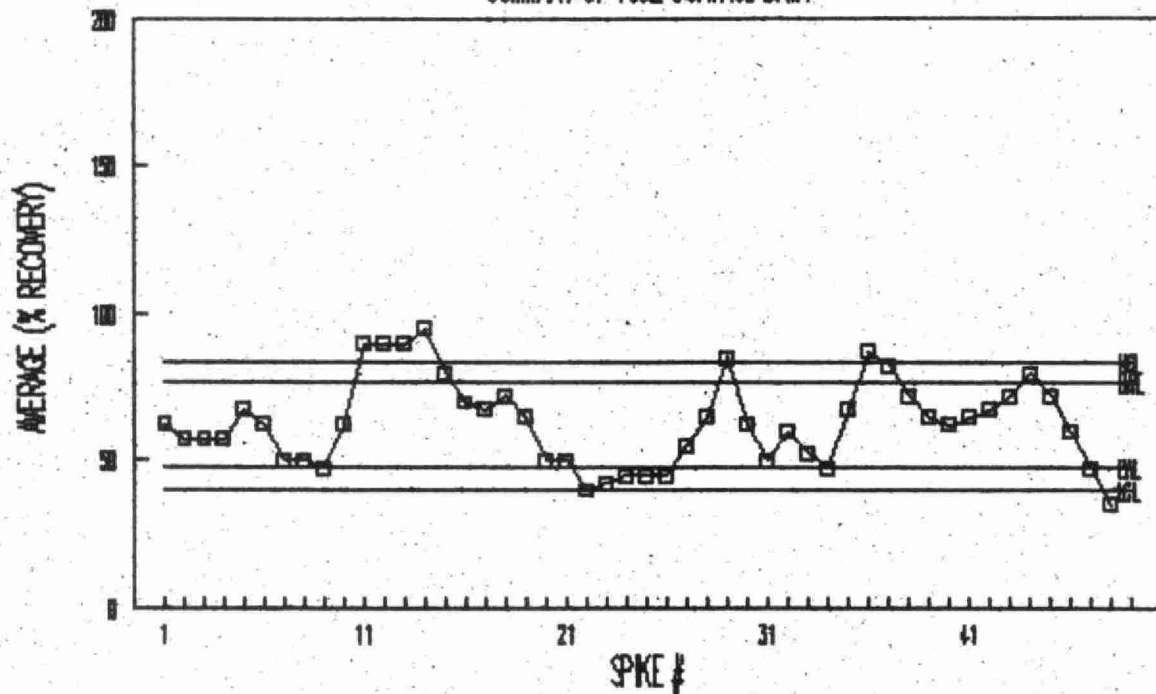
PSAOC: OCSTYR

SUMMARY OF 1992 CONTROL DATA



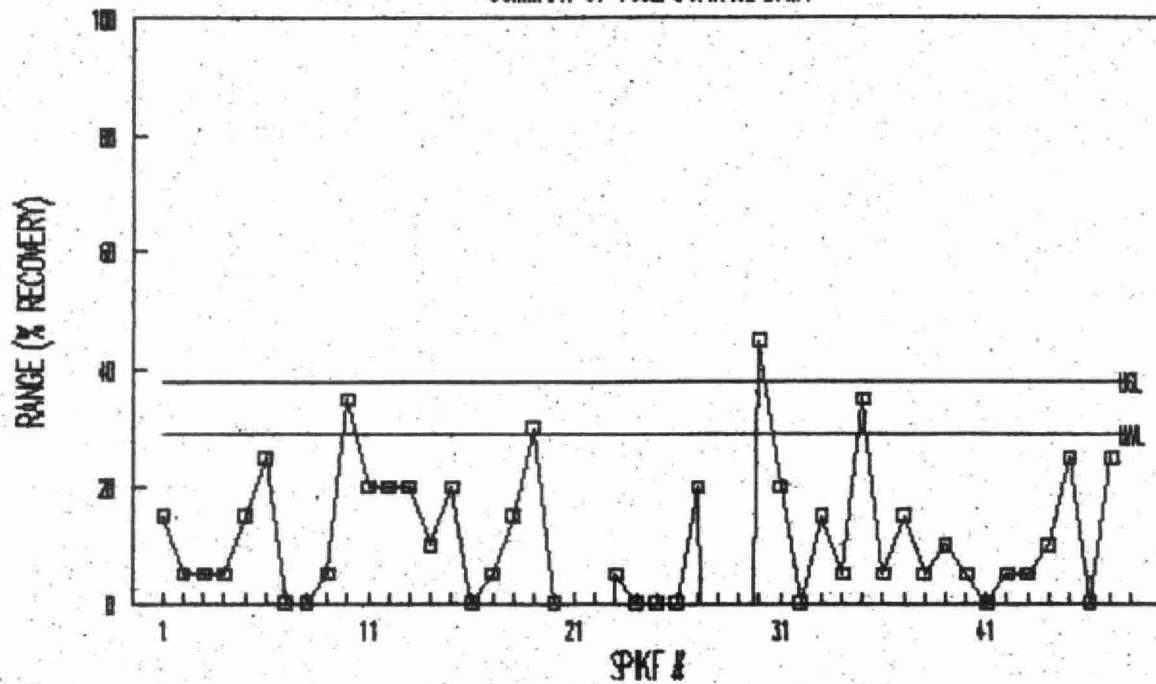
PSAOC: HCB

SUMMARY OF 1992 CONTROL DATA



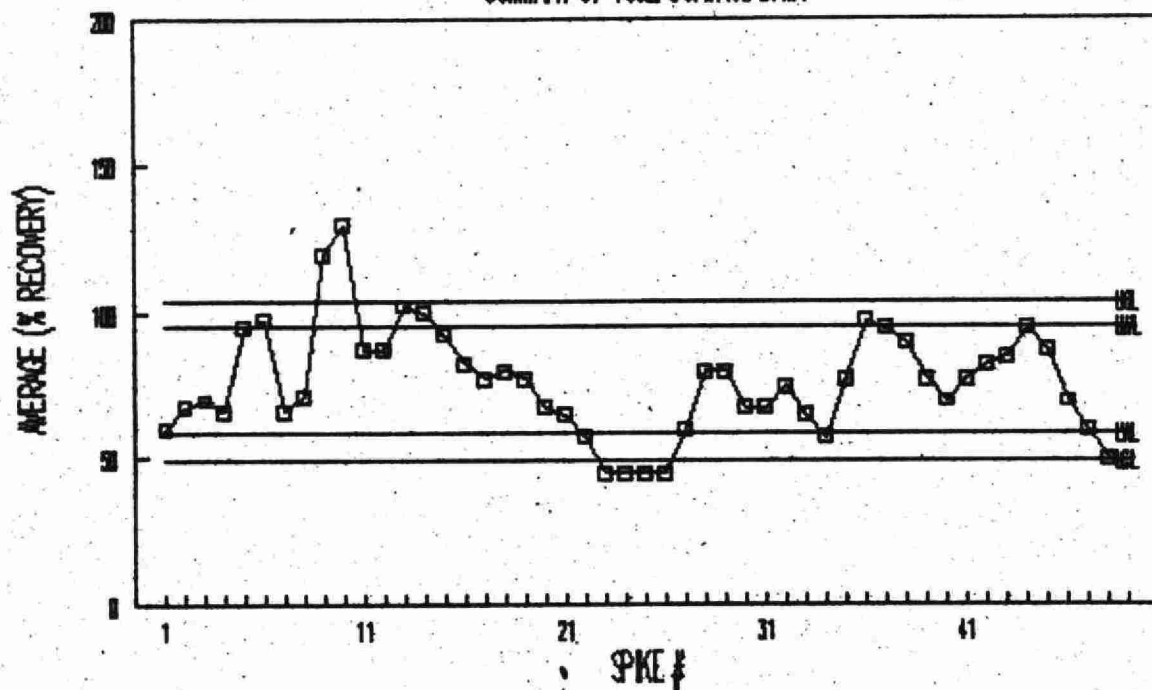
PSAOC: HCB

SUMMARY OF 1992 CONTROL DATA



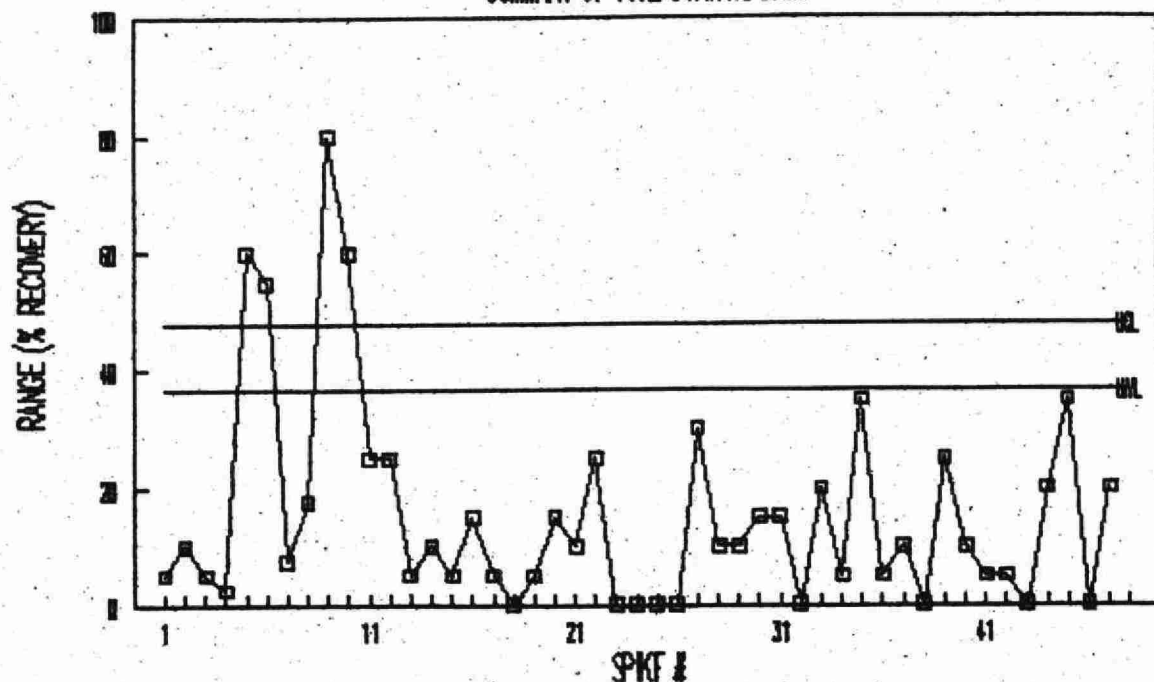
PSAOC: 123TCB

SUMMARY OF 1992 CONTROL DATA



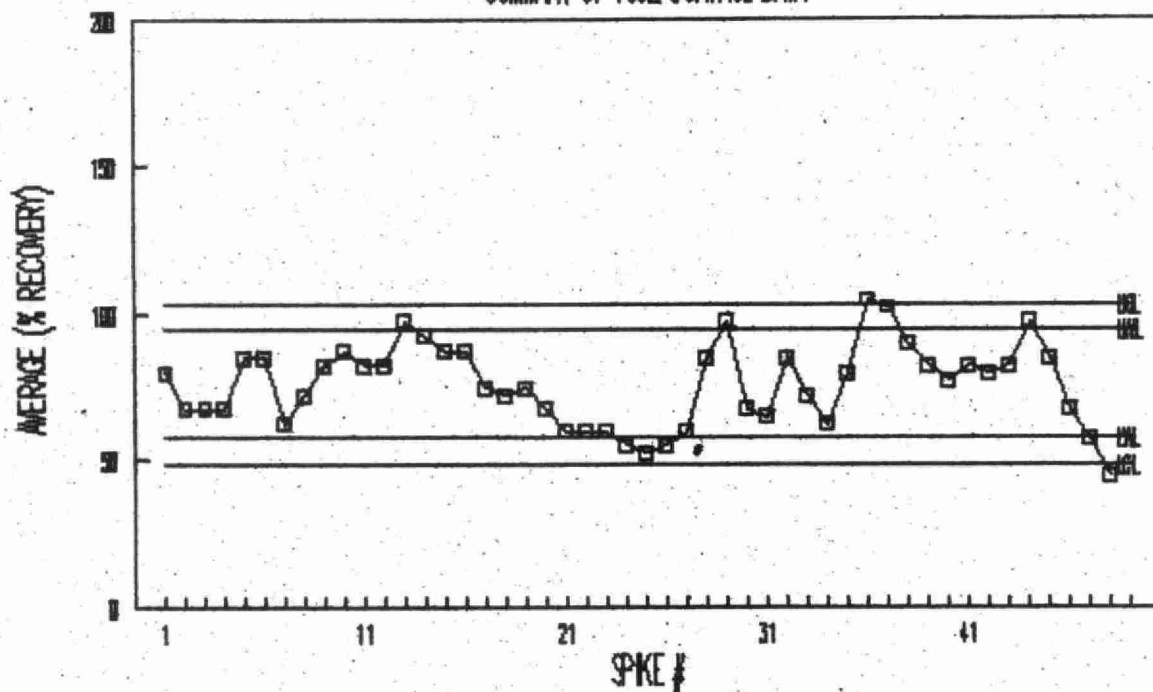
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SUMMARY OF 1992 CONTROL DATA



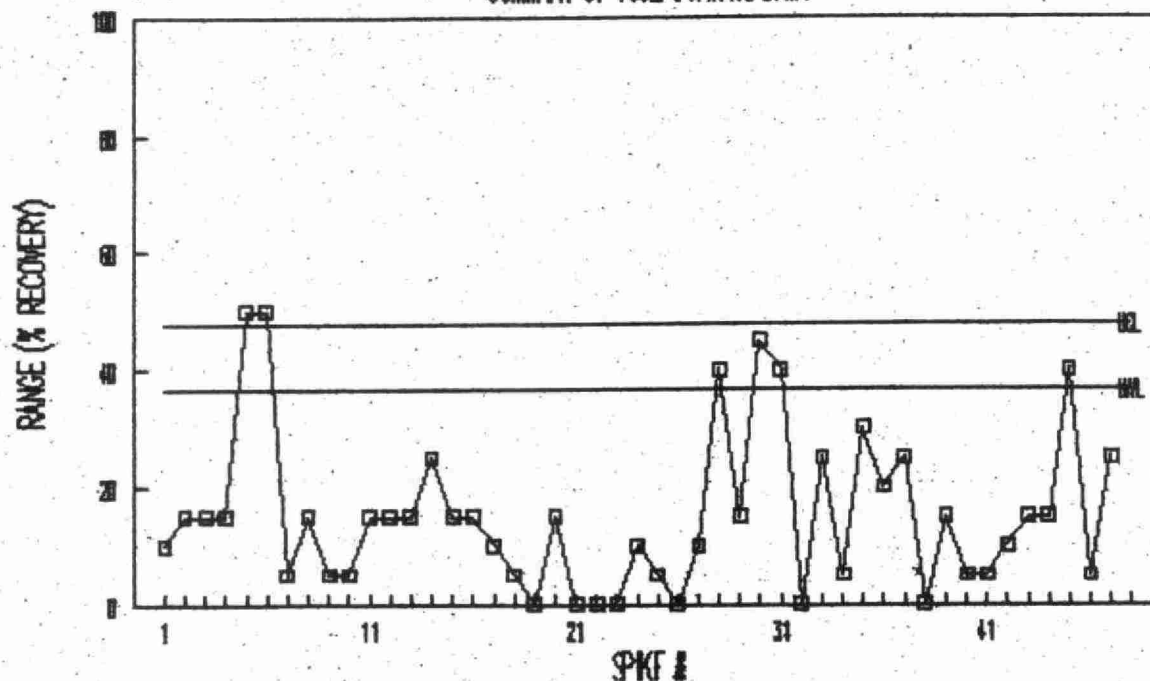
PSAOC: 1234CB

SUMMARY OF 1992 CONTROL DATA



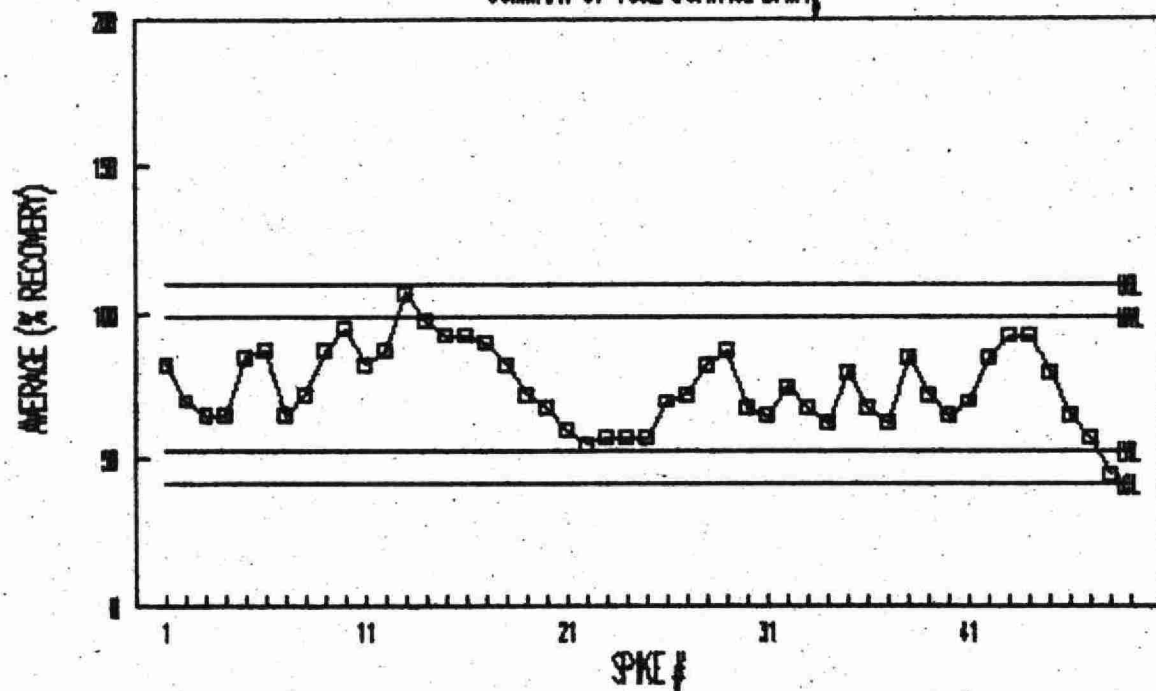
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SUMMARY OF 1992 CONTROL DATA



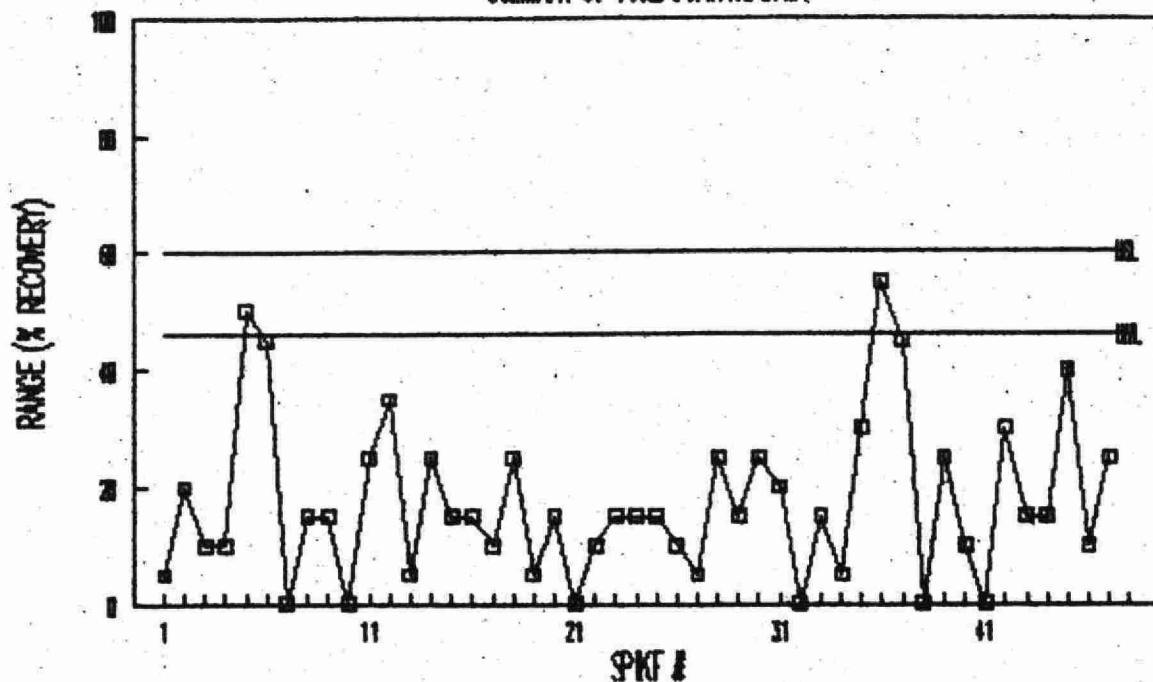
PSAOC: 1235CB

SUMMARY OF 1992 CONTROL DATA,



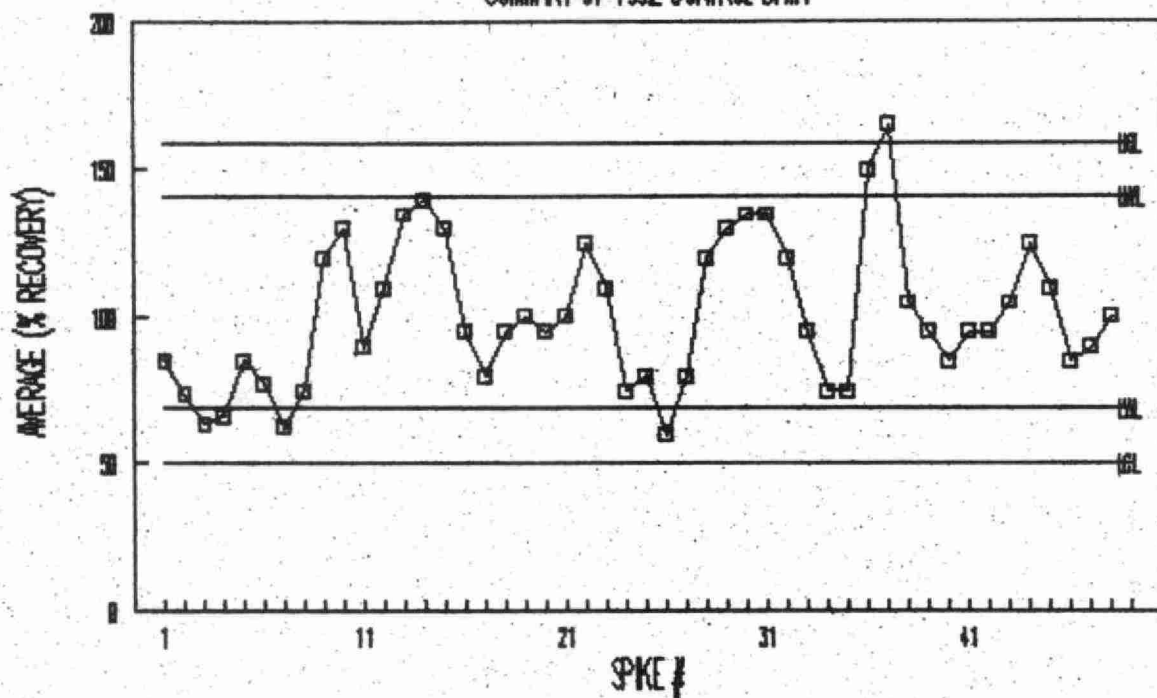
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SUMMARY OF 1992 CONTROL DATA



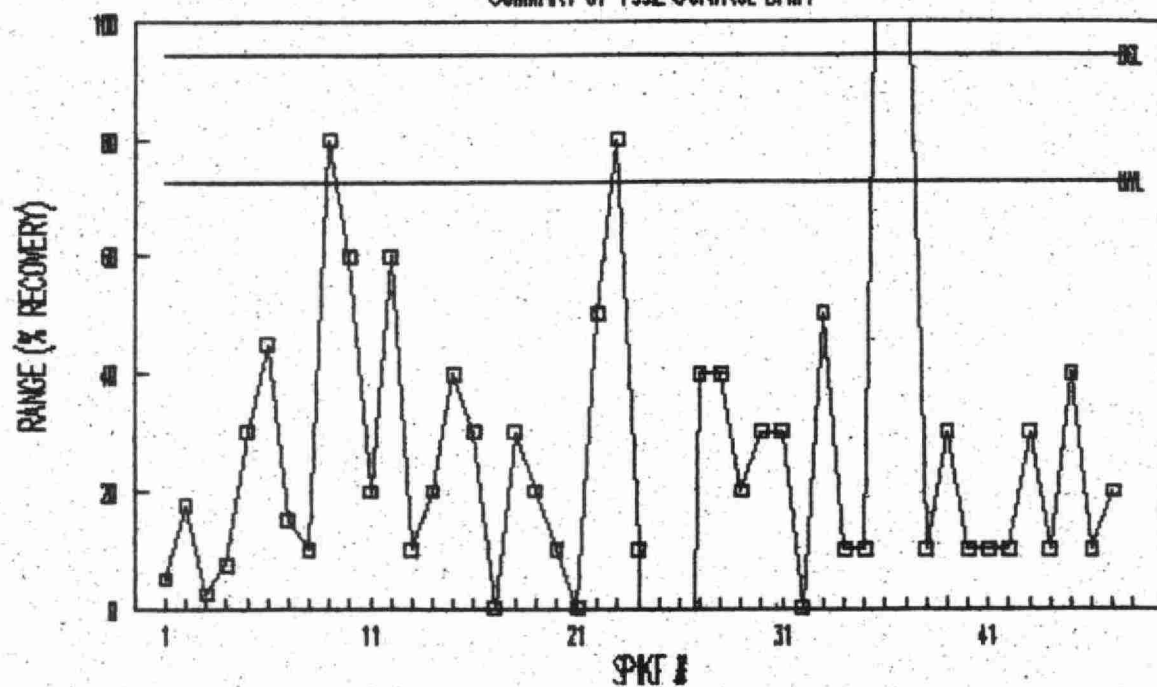
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SUMMARY OF 1992 CONTROL DATA



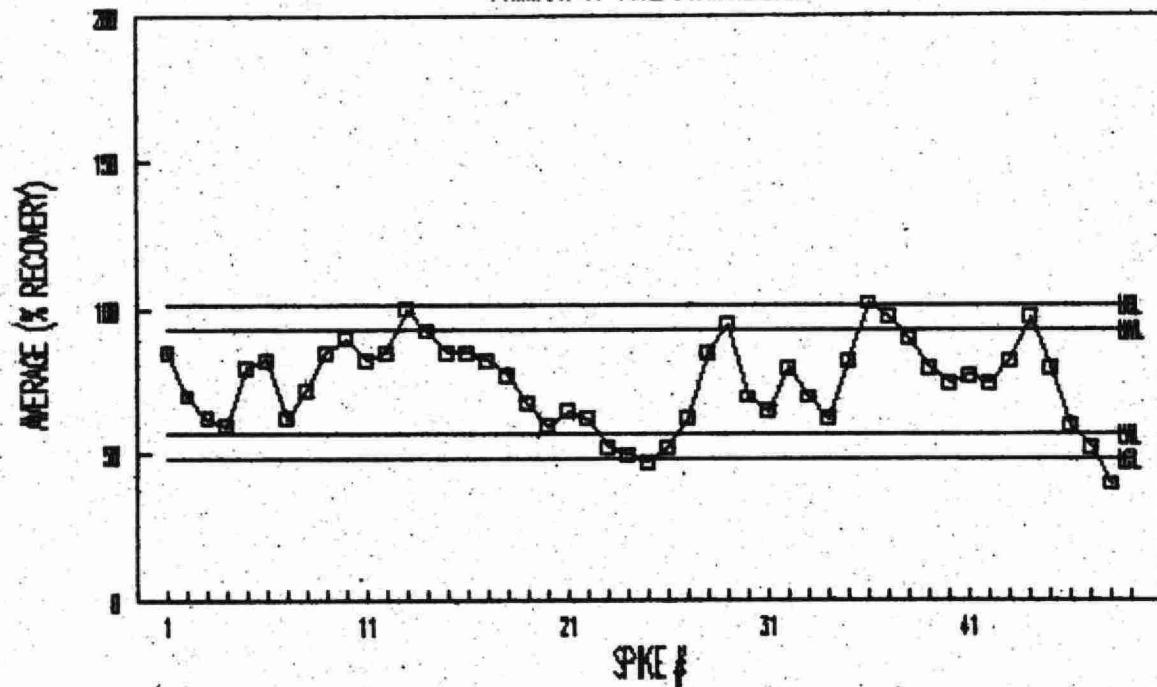
PSAOC: 124TCB

SUMMARY OF 1992 CONTROL DATA



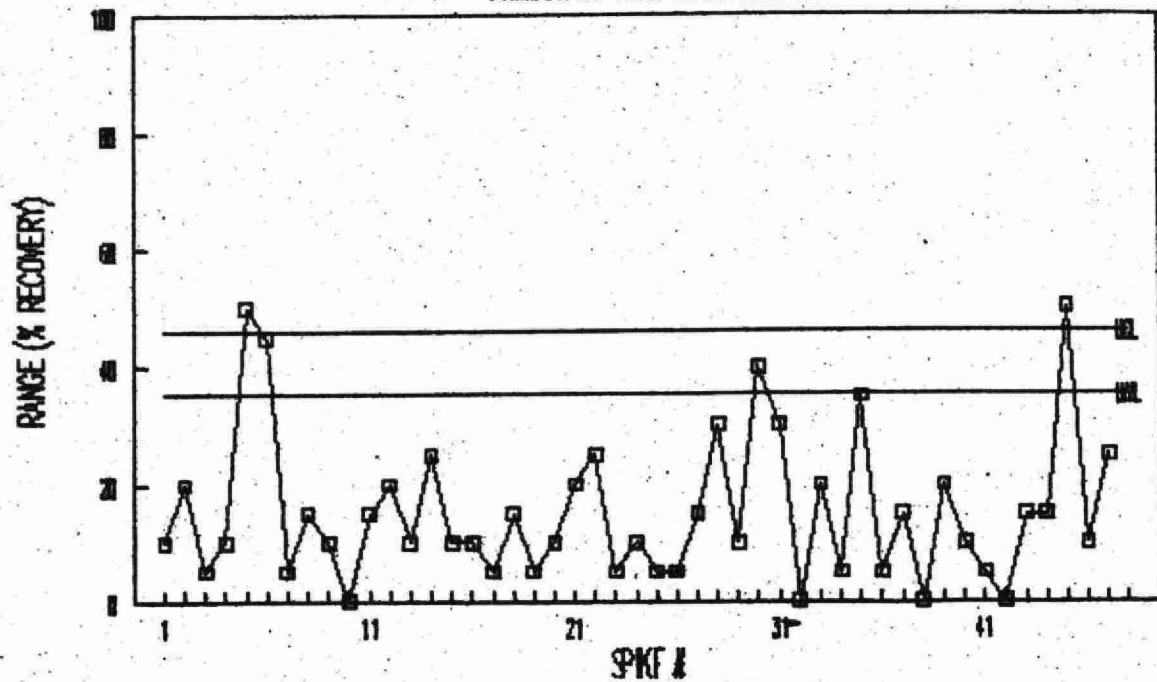
PSAOC: 1245CB

SUMMARY OF 1992 CONTROL DATA



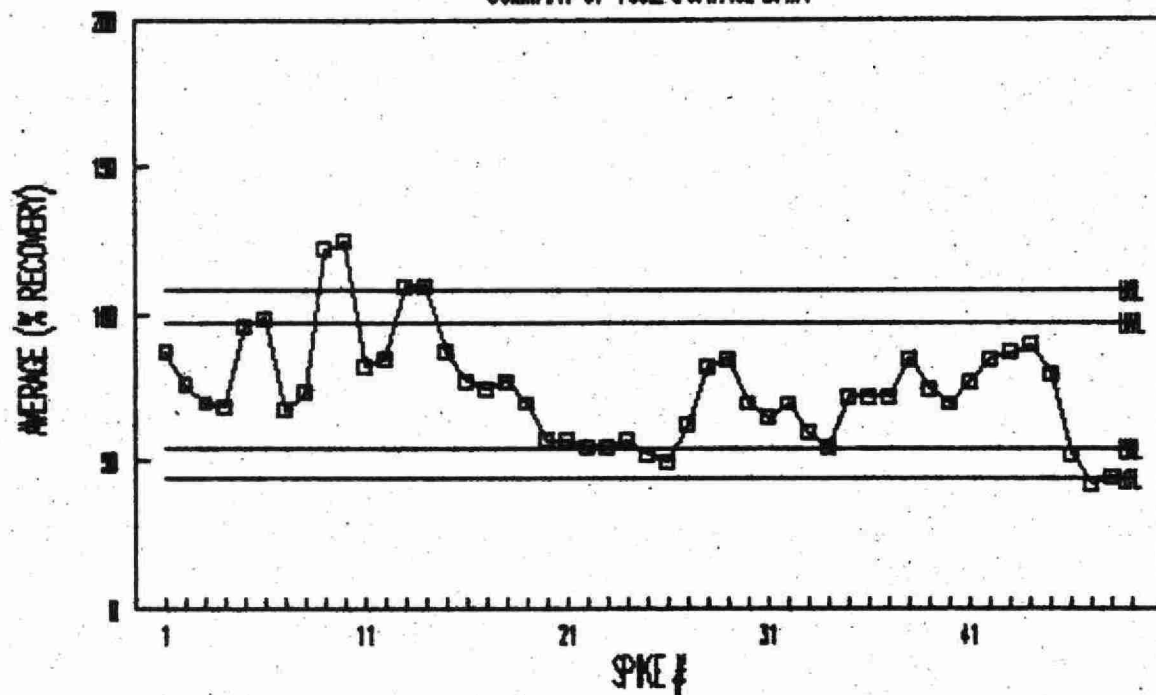
PSAOC: 1245CB

SUMMARY OF 1992 CONTROL DATA



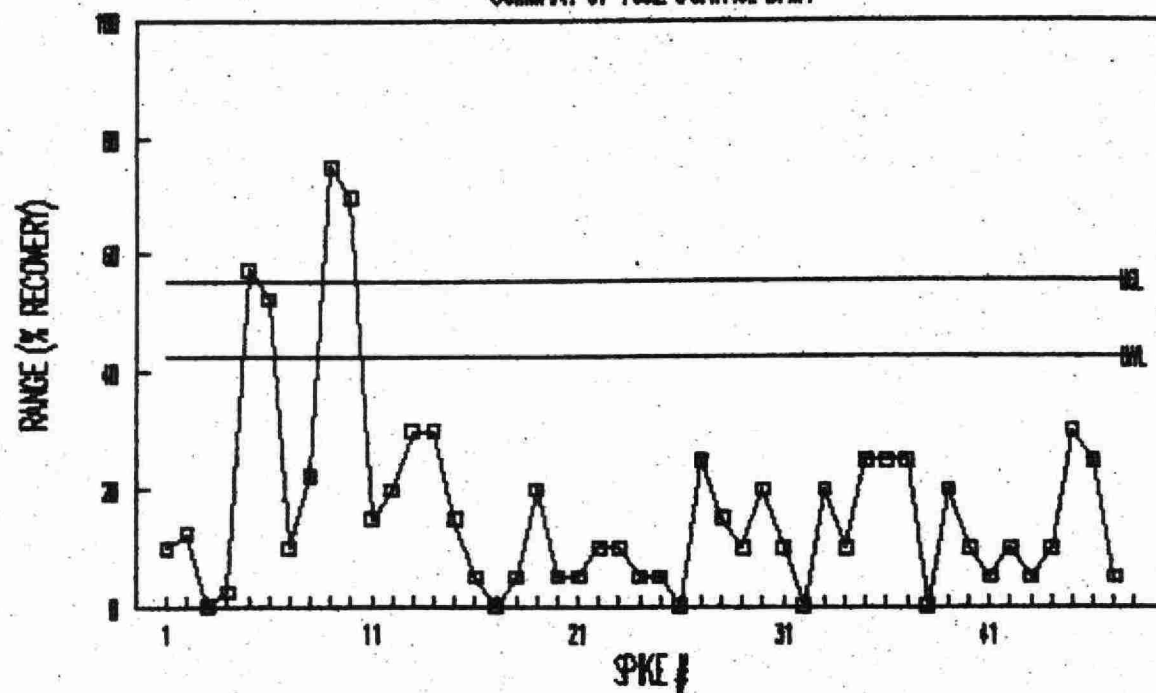
PSAOC: 135TCB

SUMMARY OF 1992 CONTROL DATA



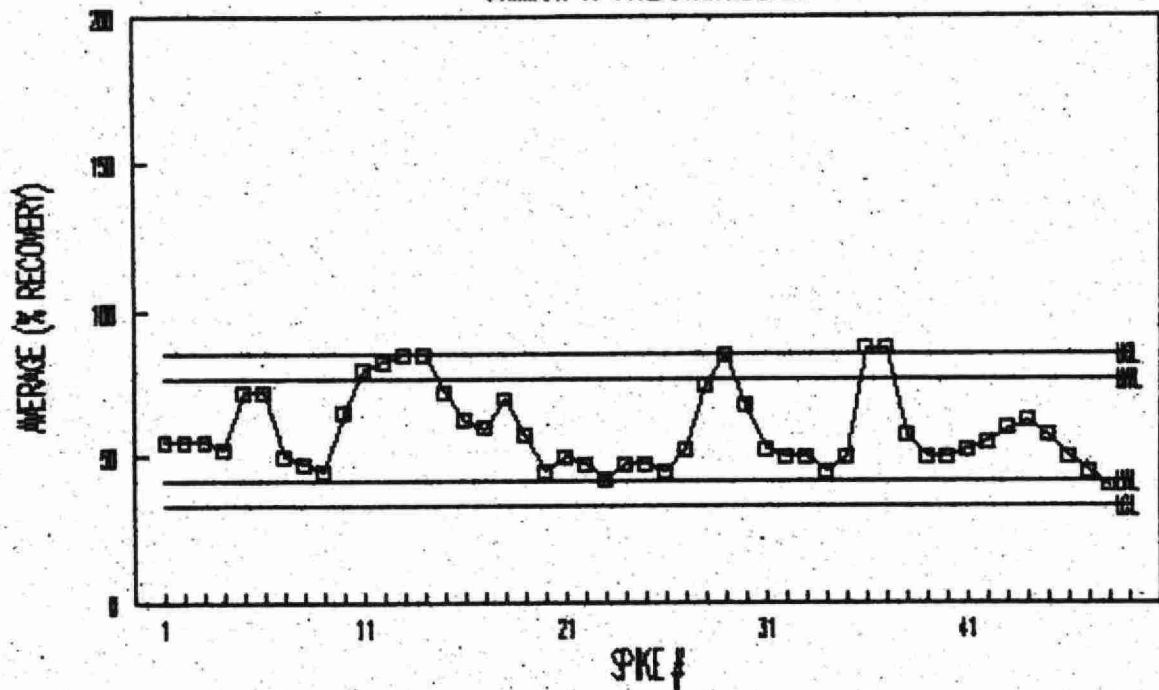
PSAOC: 135TCB

SUMMARY OF 1992 CONTROL DATA



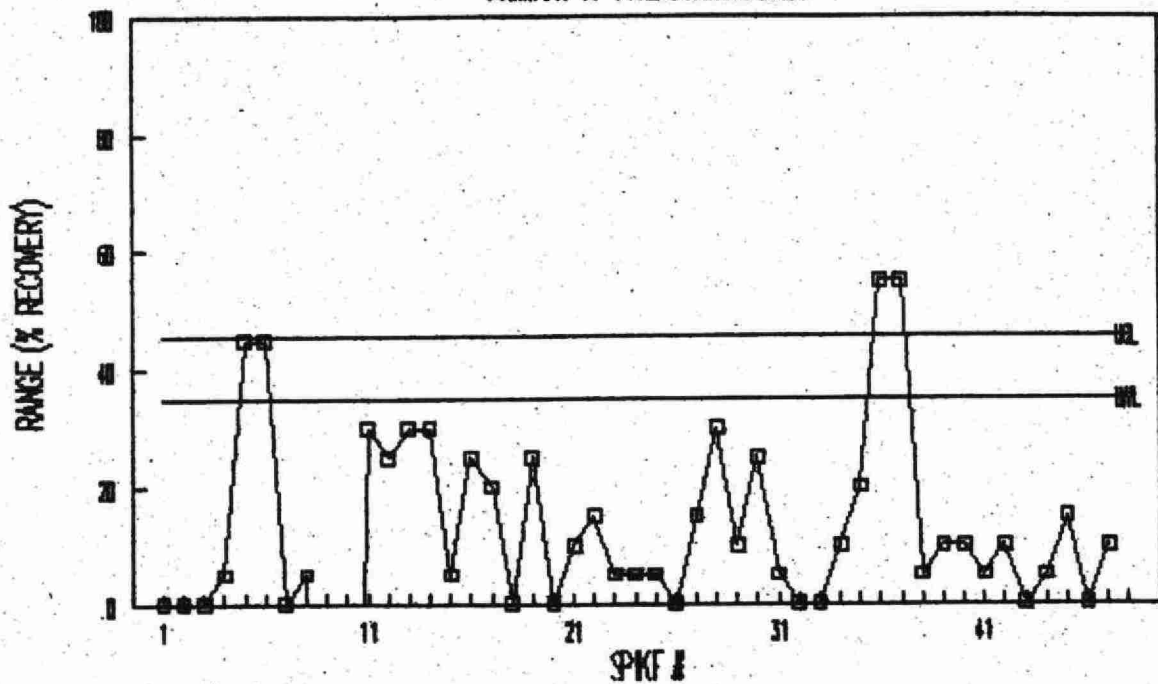
PSAOC: HCE

SUMMARY OF 1992 CONTROL DATA



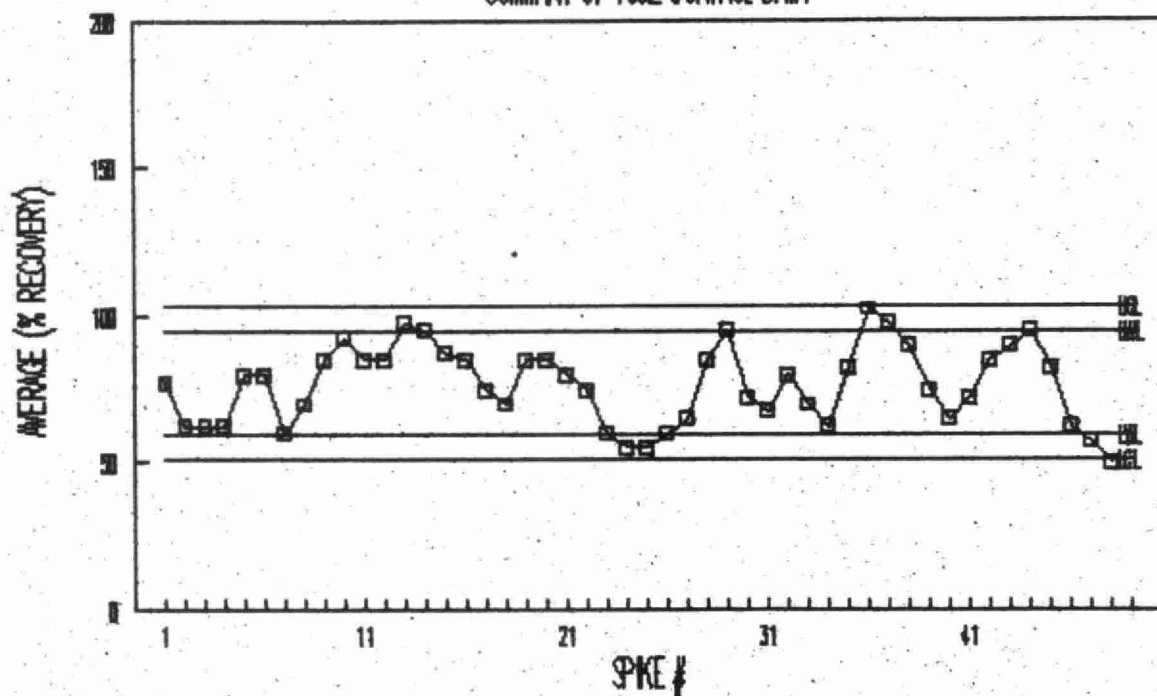
PSAOC: HCE

SUMMARY OF 1992 CONTROL DATA



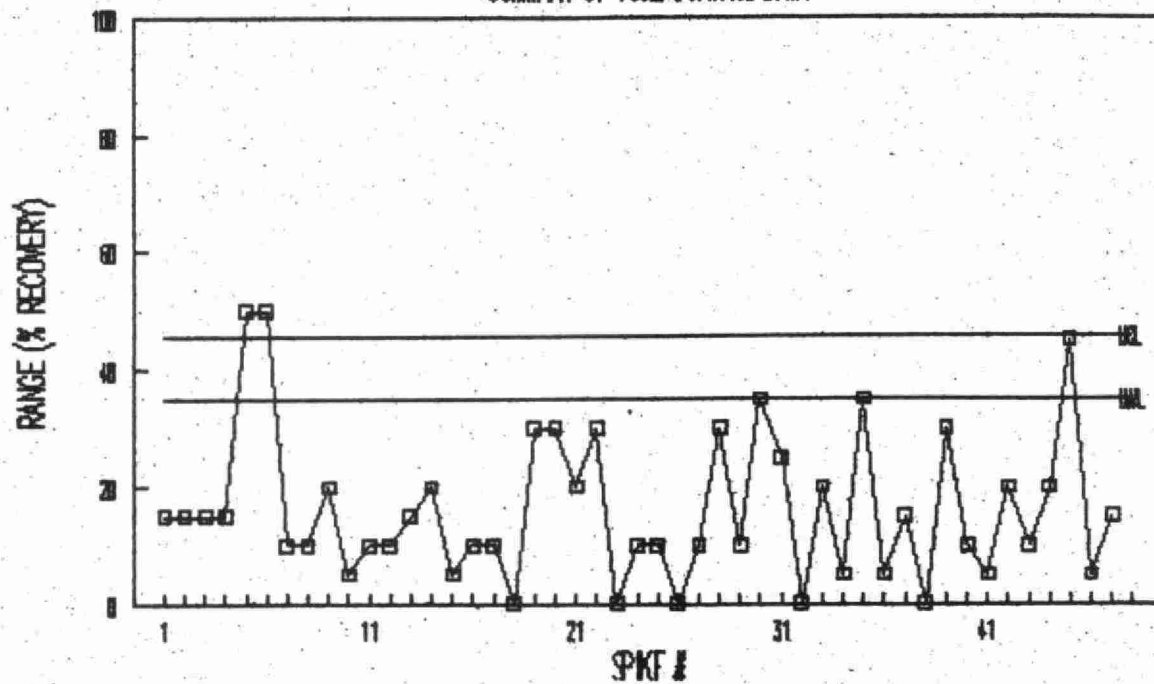
PSAOC: PNCB

SUMMARY OF 1992 CONTROL DATA



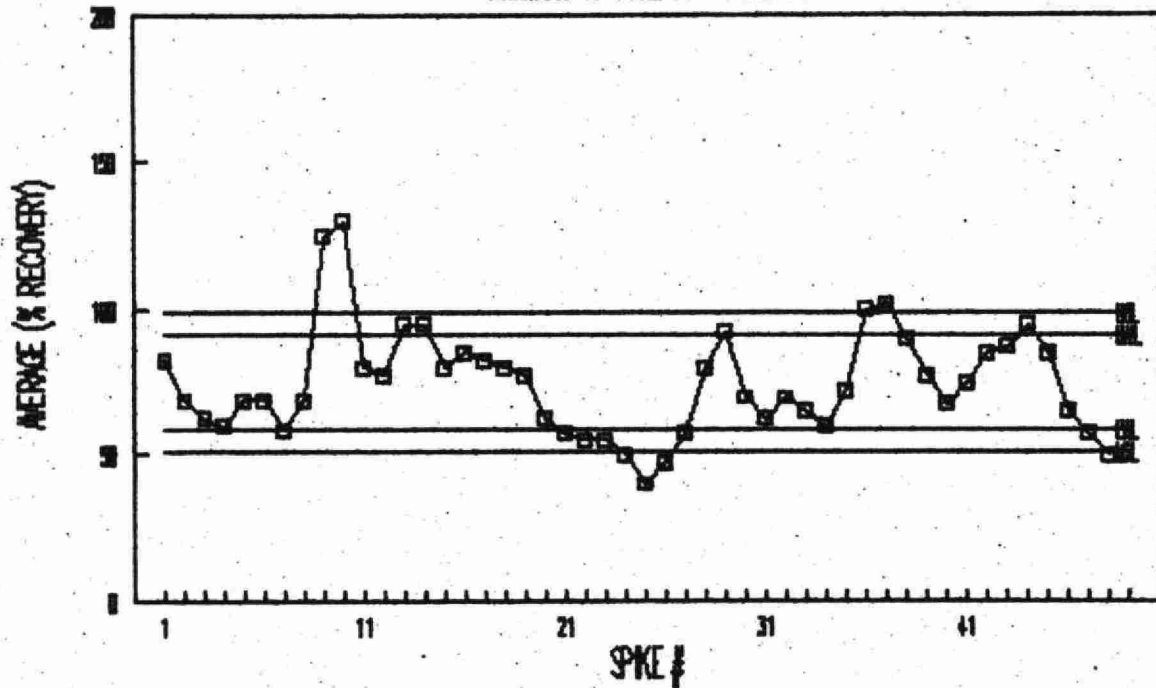
PSAOC: PNCB

SUMMARY OF 1992 CONTROL DATA



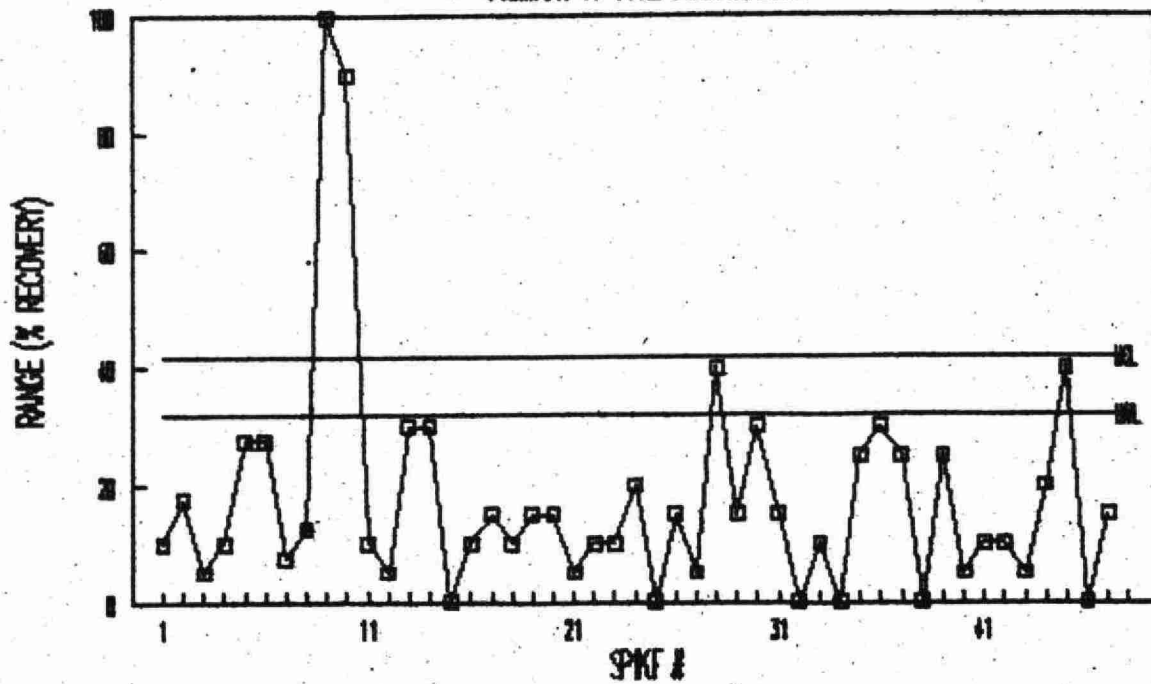
PSAOC: 236TCB

SUMMARY OF 1992 CONTROL DATA



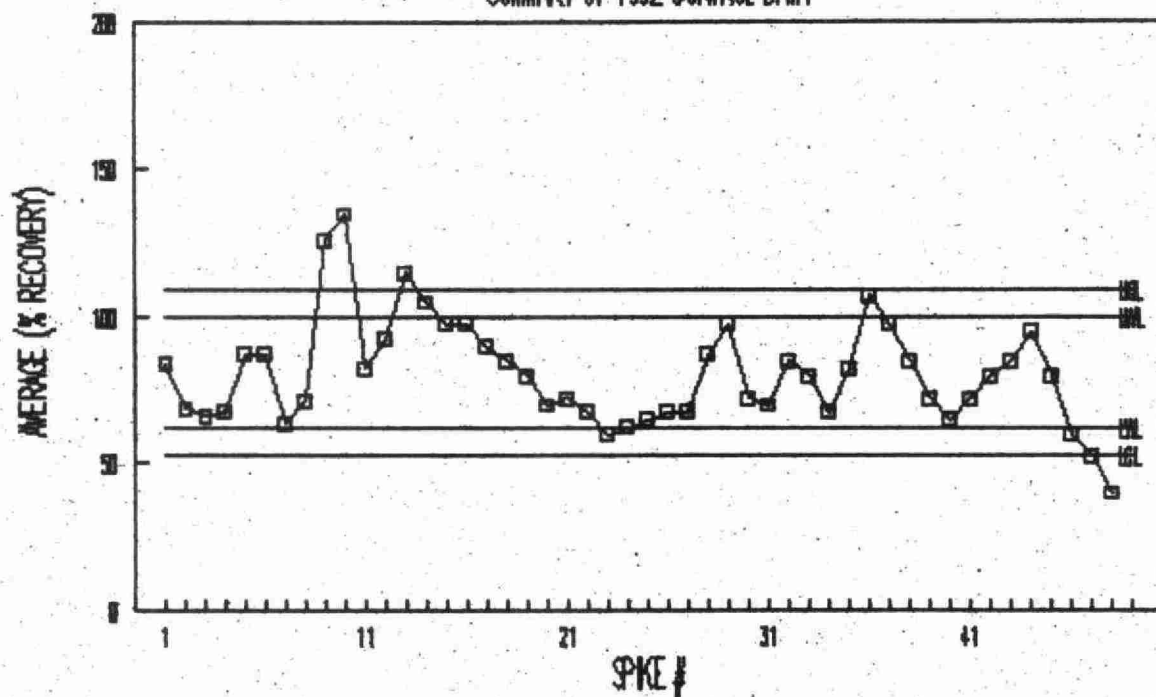
PSAOC: 236TCB

SUMMARY OF 1992 CONTROL DATA



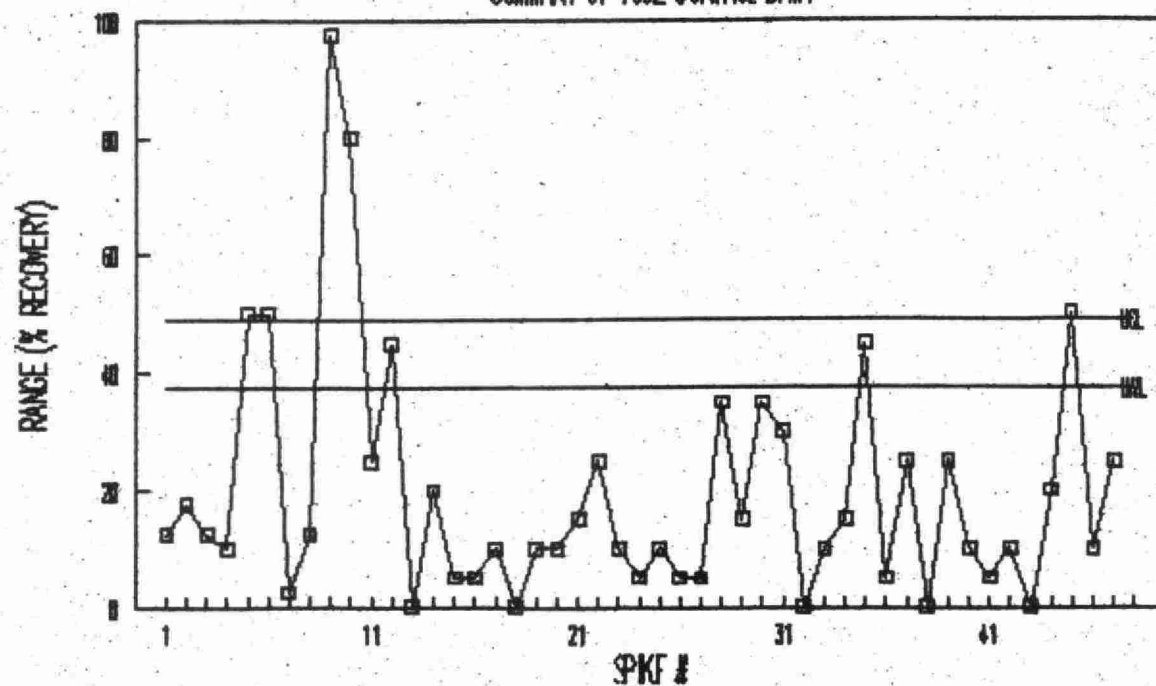
PSAOC: 245TCB

SUMMARY OF 1992 CONTROL DATA



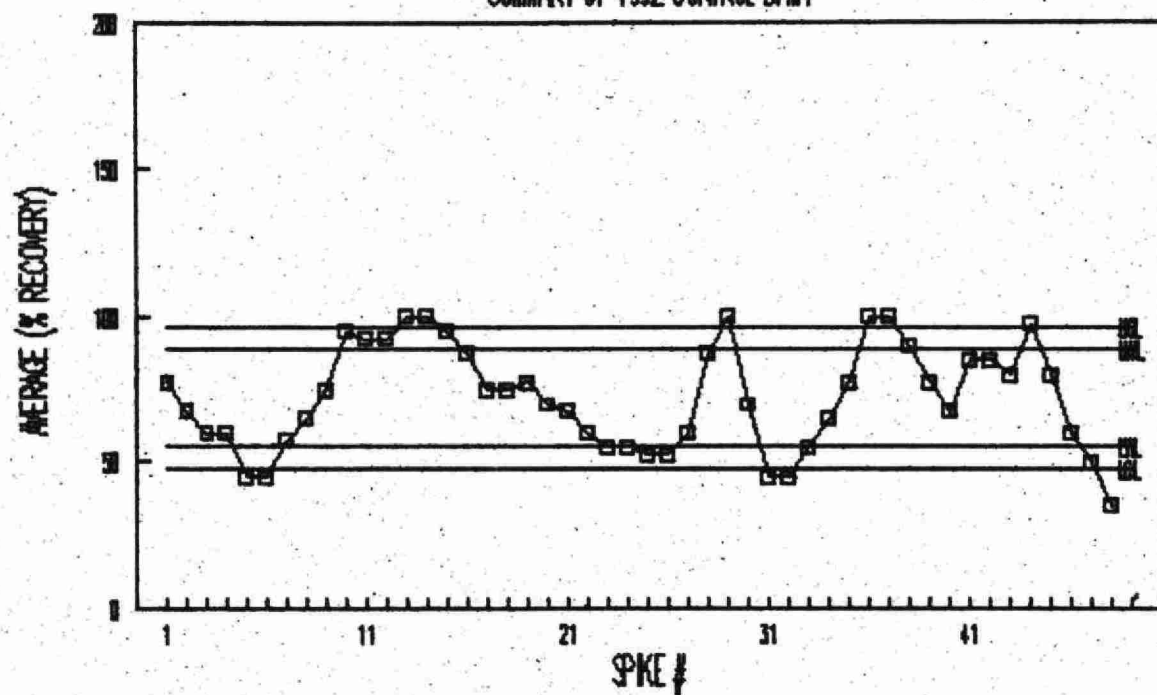
PSAOC: 245TCB

SUMMARY OF 1992 CONTROL DATA



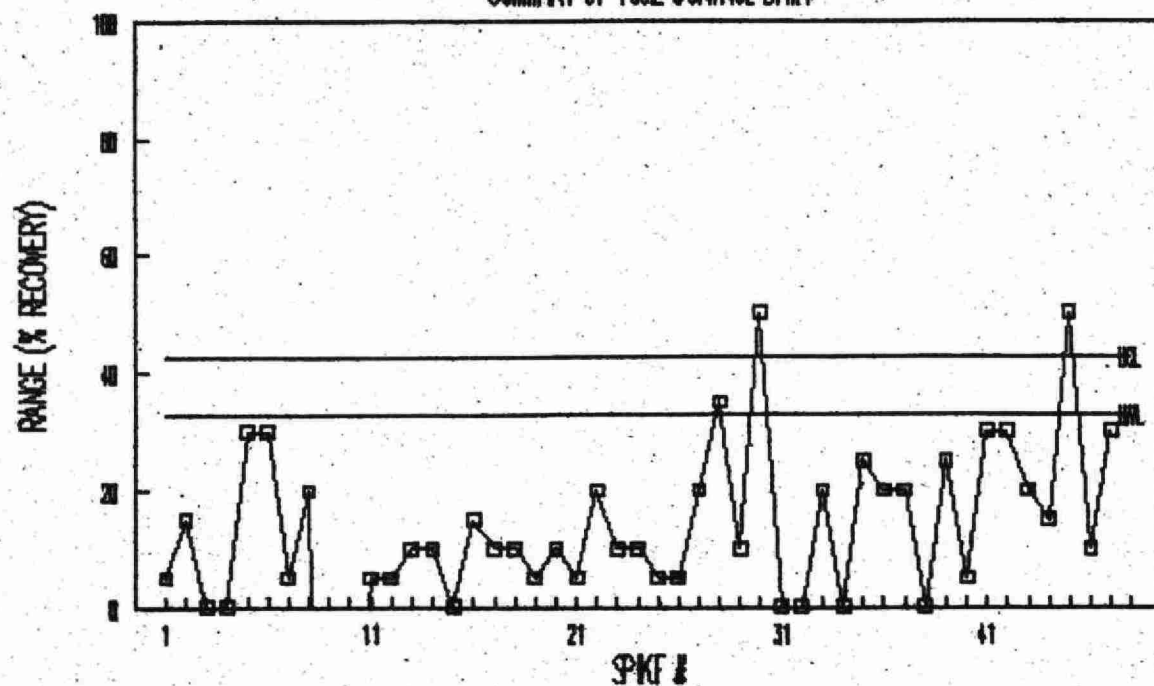
PSAOC: A26TCT

SUMMARY OF 1992 CONTROL DATA



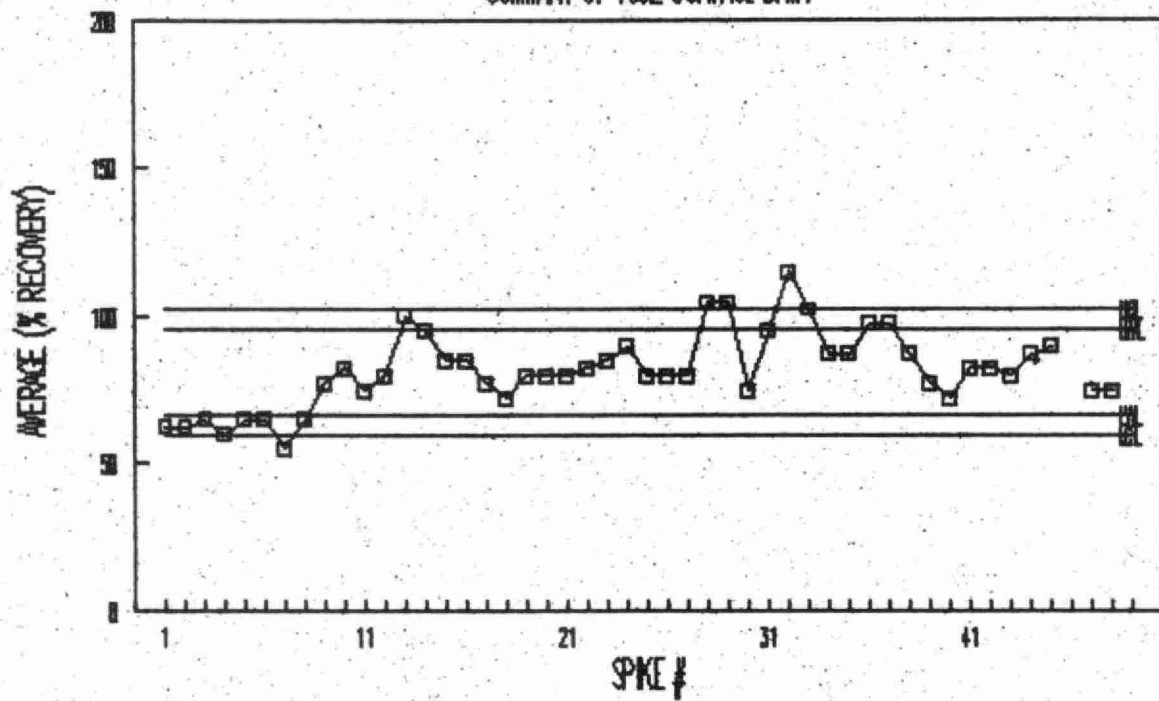
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SUMMARY OF 1992 CONTROL DATA



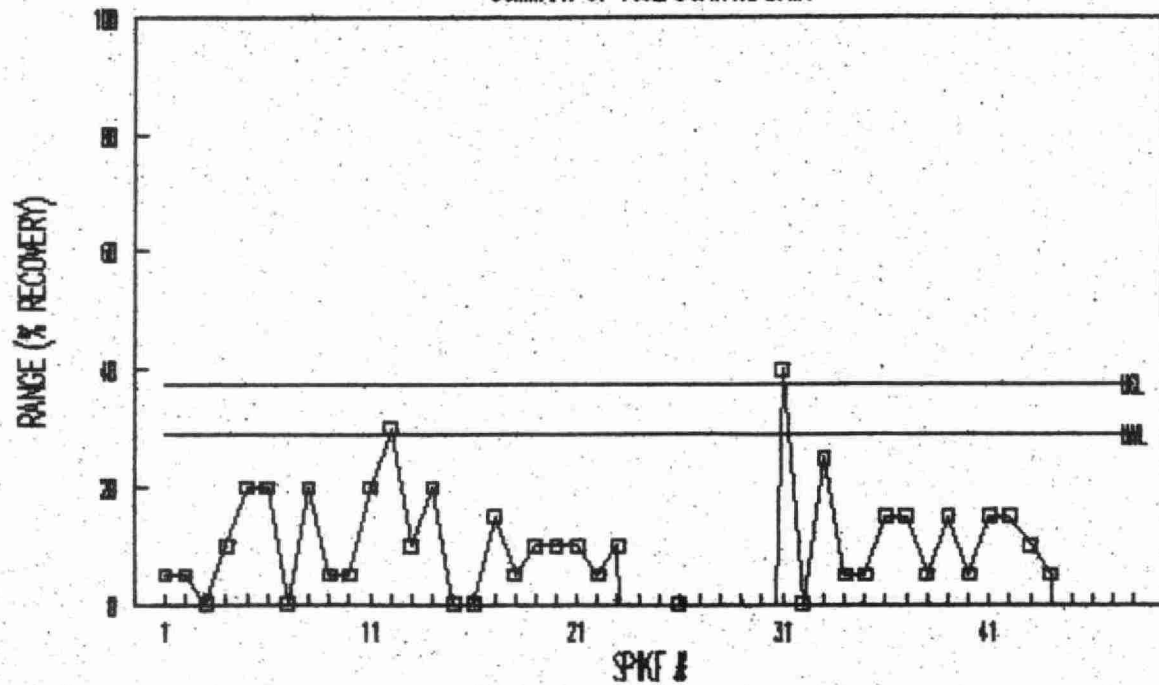
PSAOC: 135TBB

SUMMARY OF 1992 CONTROL DATA



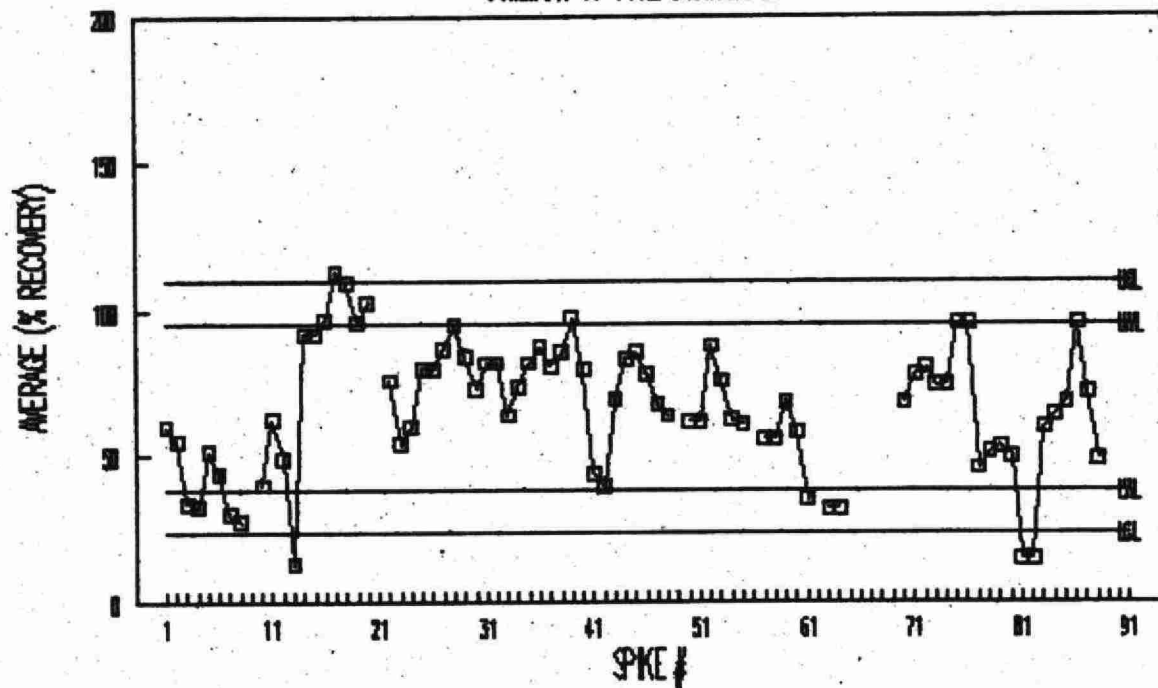
PSAOC: 135TBB

SUMMARY OF 1992 CONTROL DATA



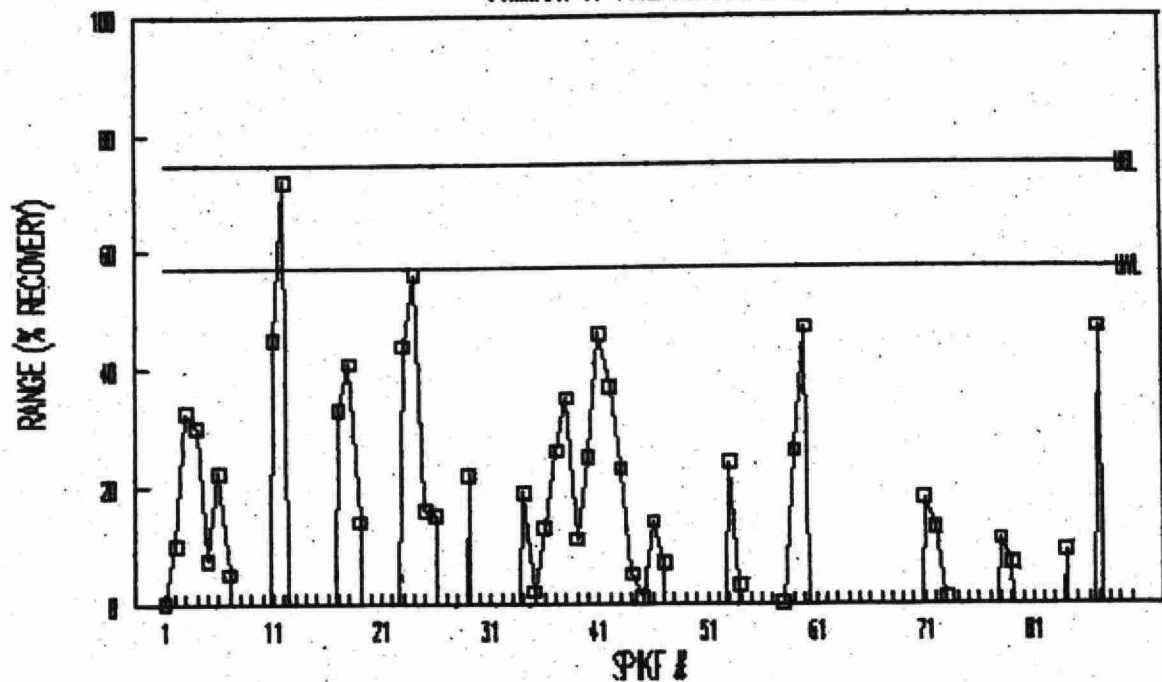
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SUMMARY OF 1992 CONTROL DATA



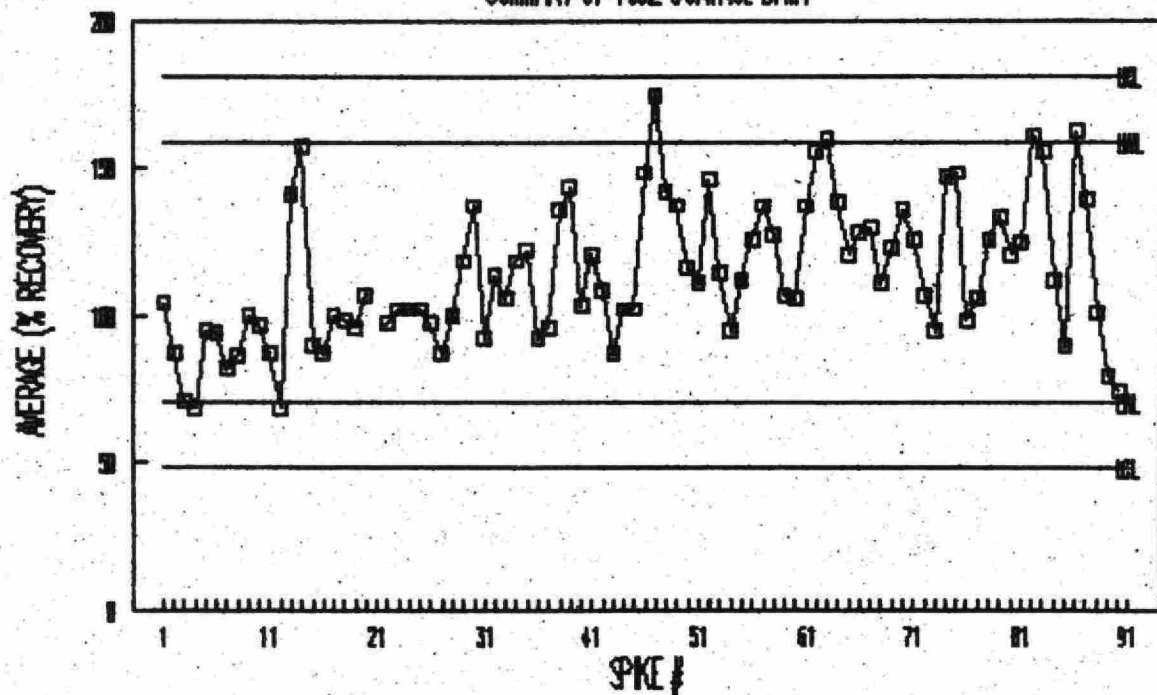
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SUMMARY OF 1992 CONTROL DATA



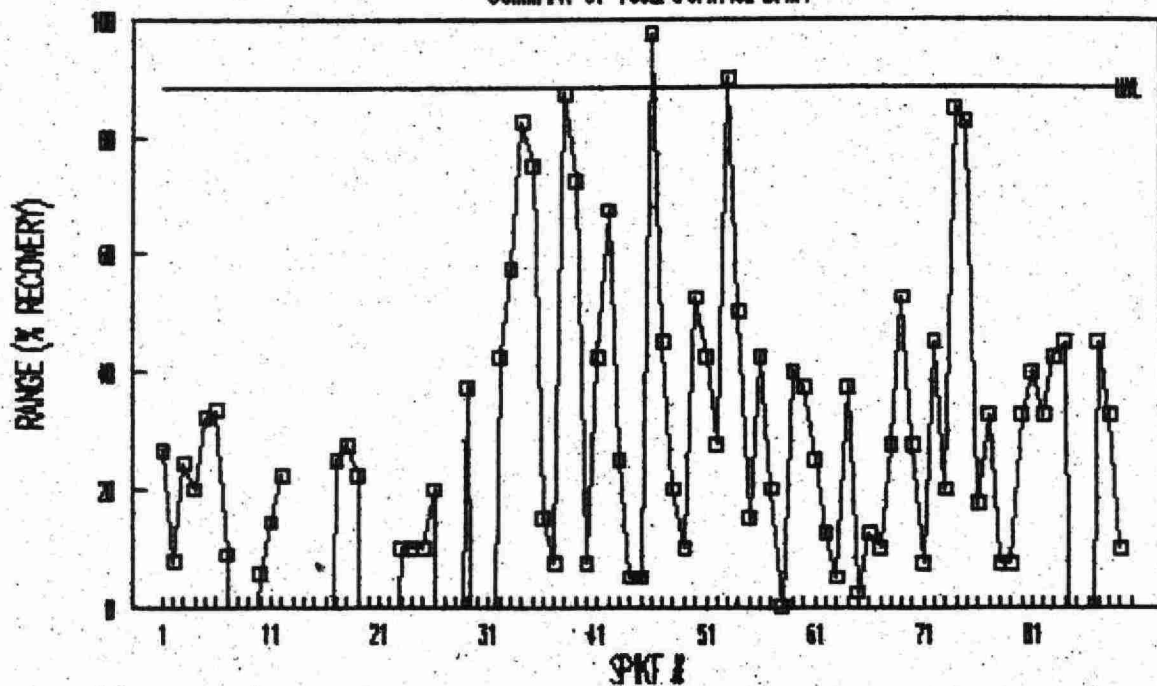
PSAOC: PPDDE

SUMMARY OF 1992 CONTROL DATA



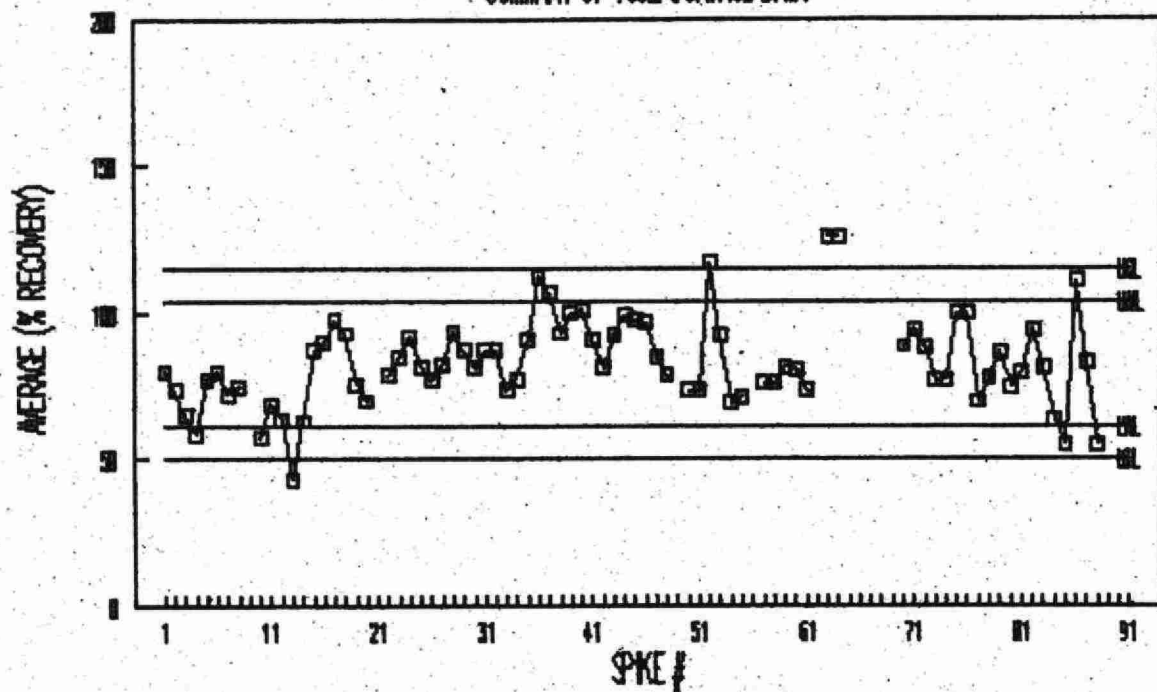
PSAOC: PPDDE

SUMMARY OF 1992 CONTROL DATA



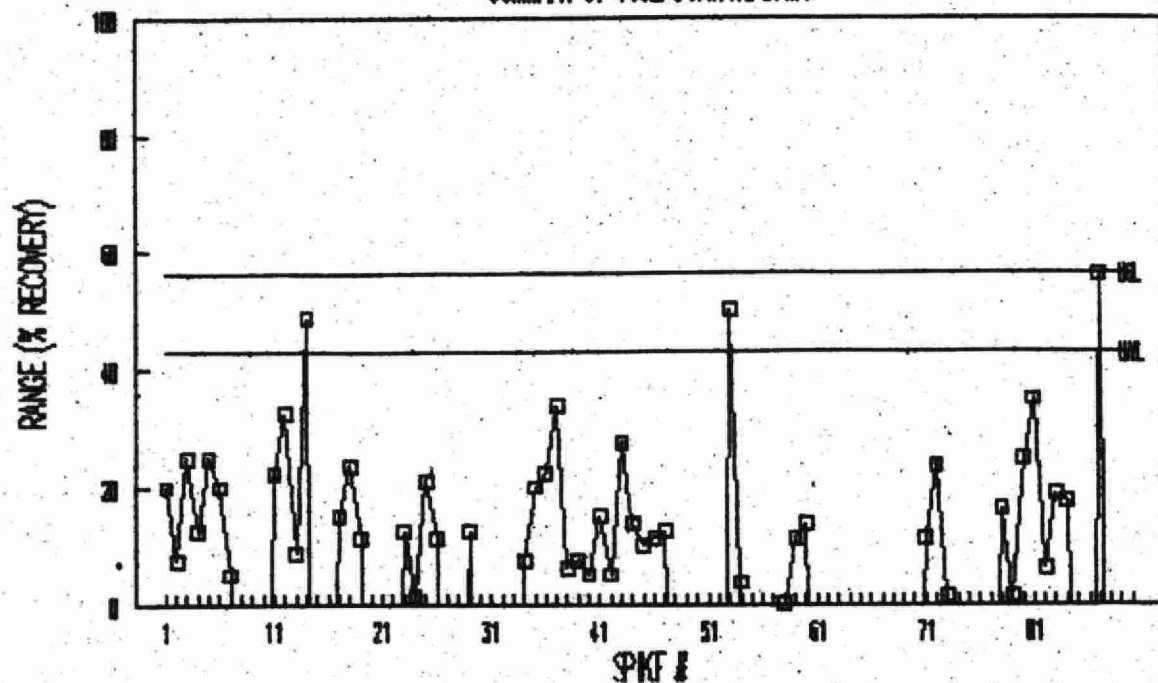
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SUMMARY OF 1992 CONTROL DATA



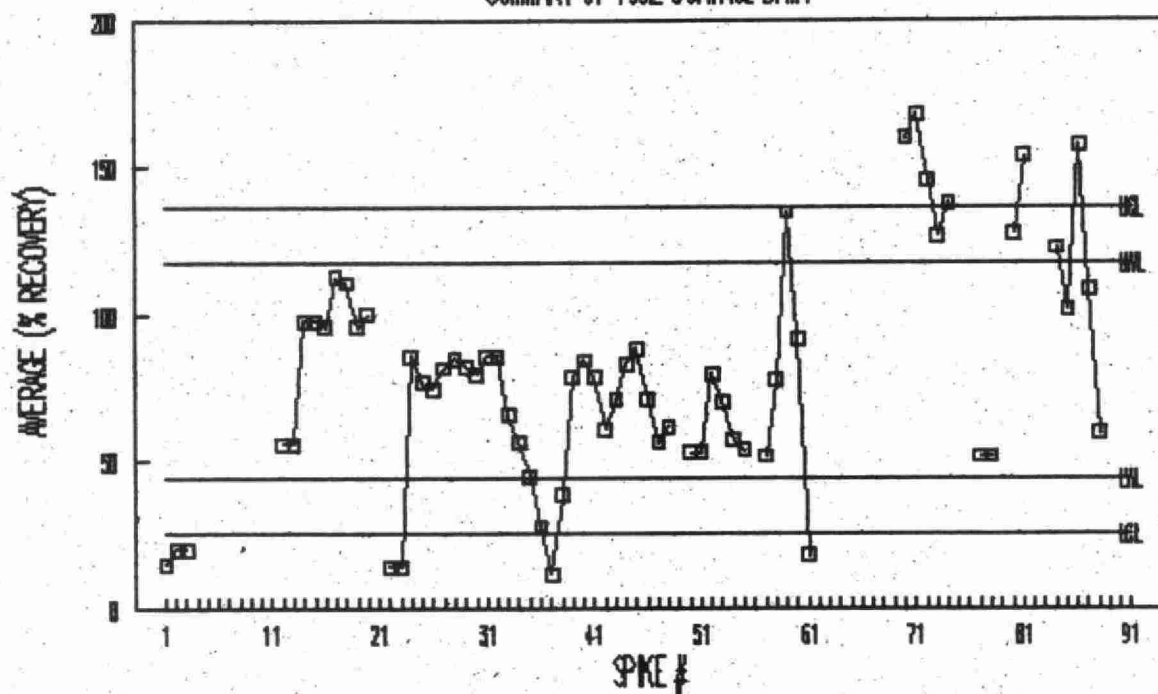
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SUMMARY OF 1992 CONTROL DATA



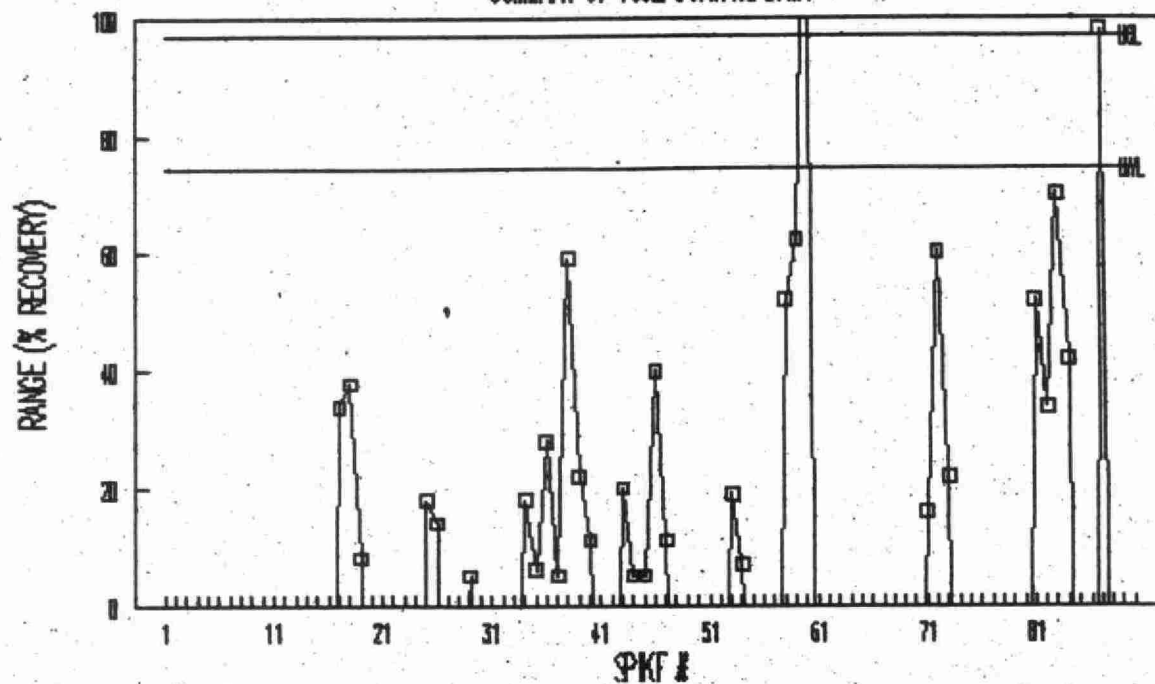
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SUMMARY OF 1992 CONTROL DATA



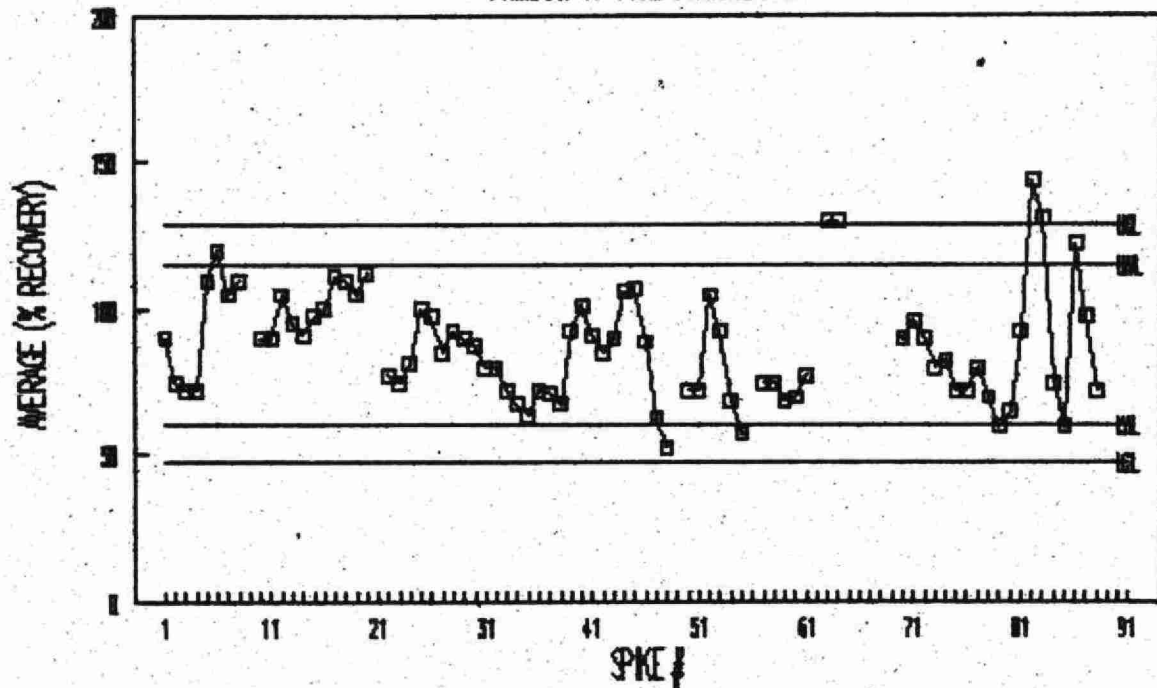
PSAOC: OPDDT

SUMMARY OF 1992 CONTROL DATA



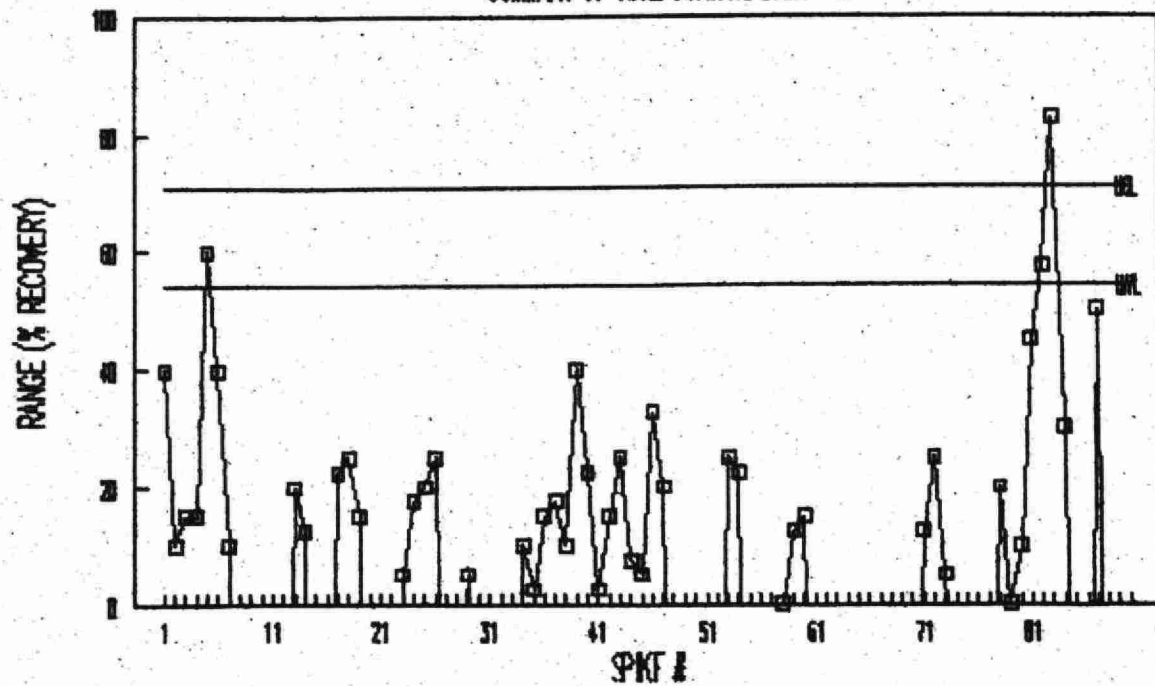
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SUMMARY OF 1992 CONTROL DATA



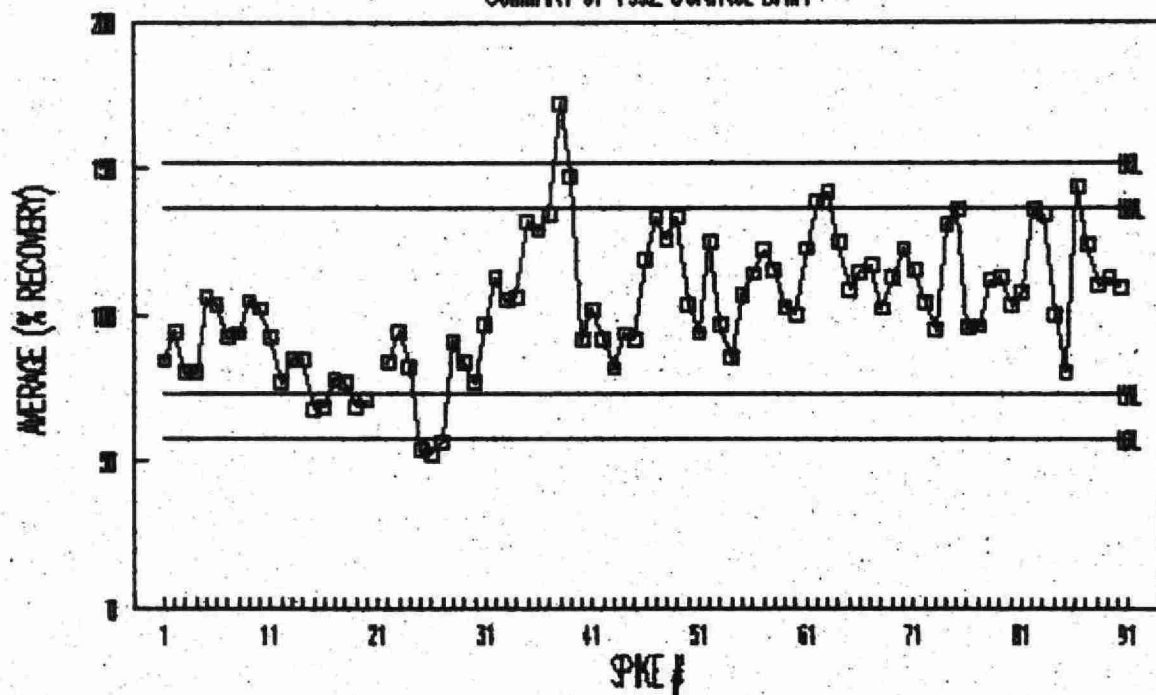
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SUMMARY OF 1992 CONTROL DATA



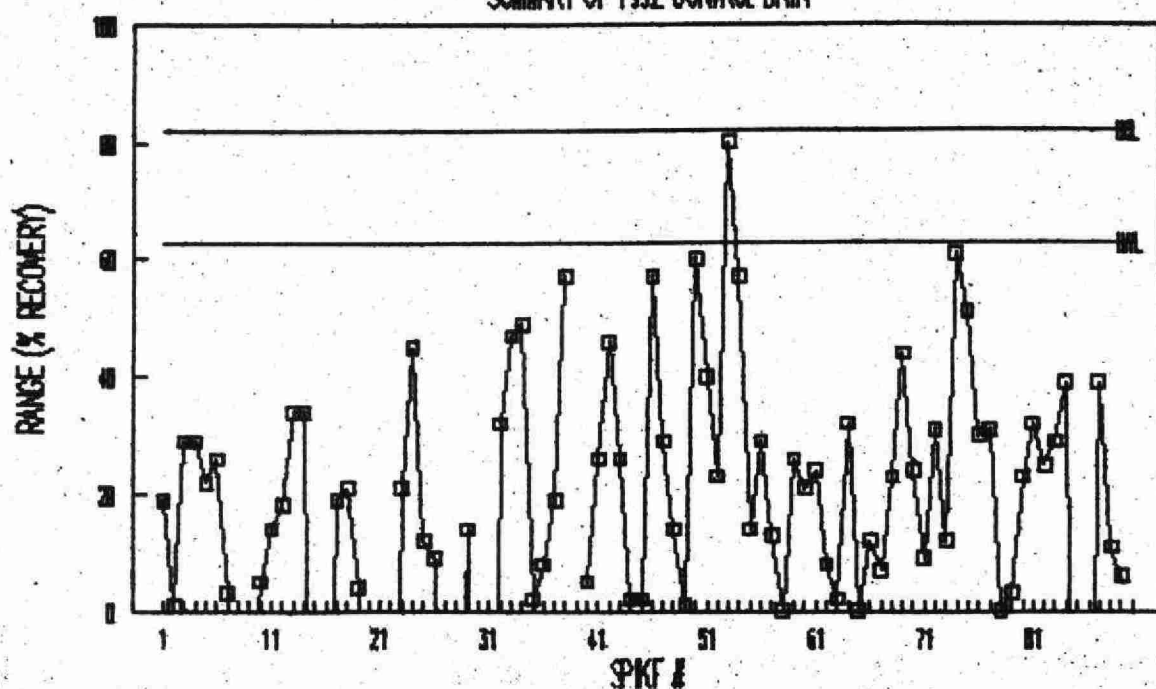
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SUMMARY OF 1992 CONTROL DATA



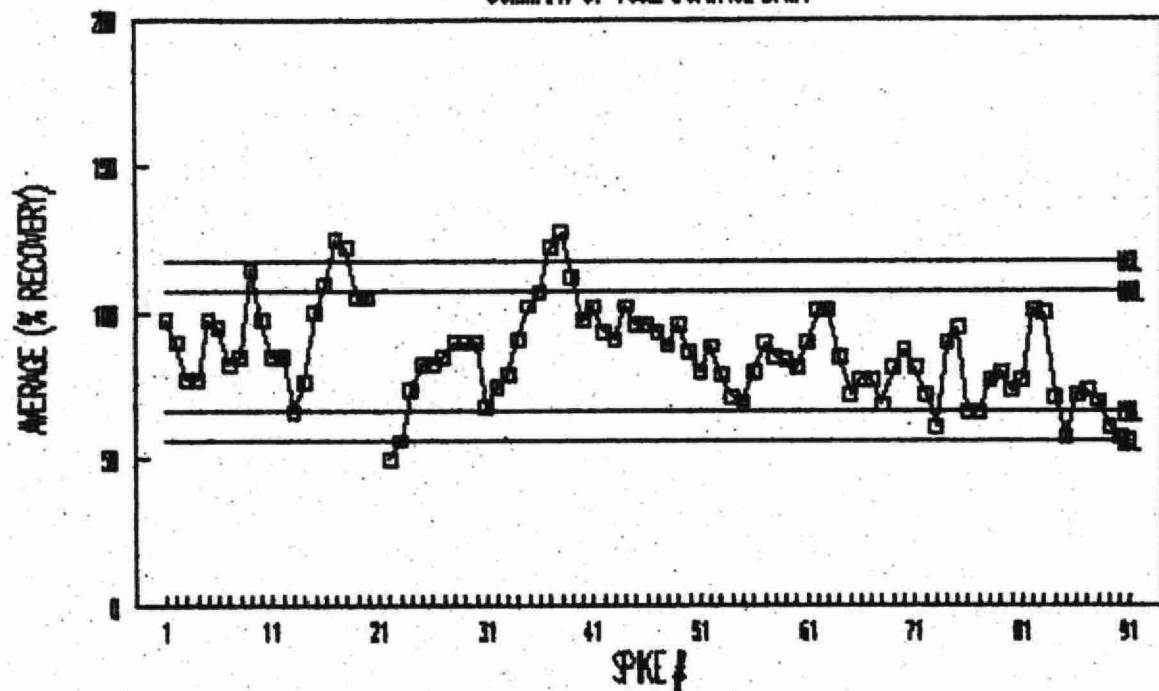
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SUMMARY OF 1992 CONTROL DATA



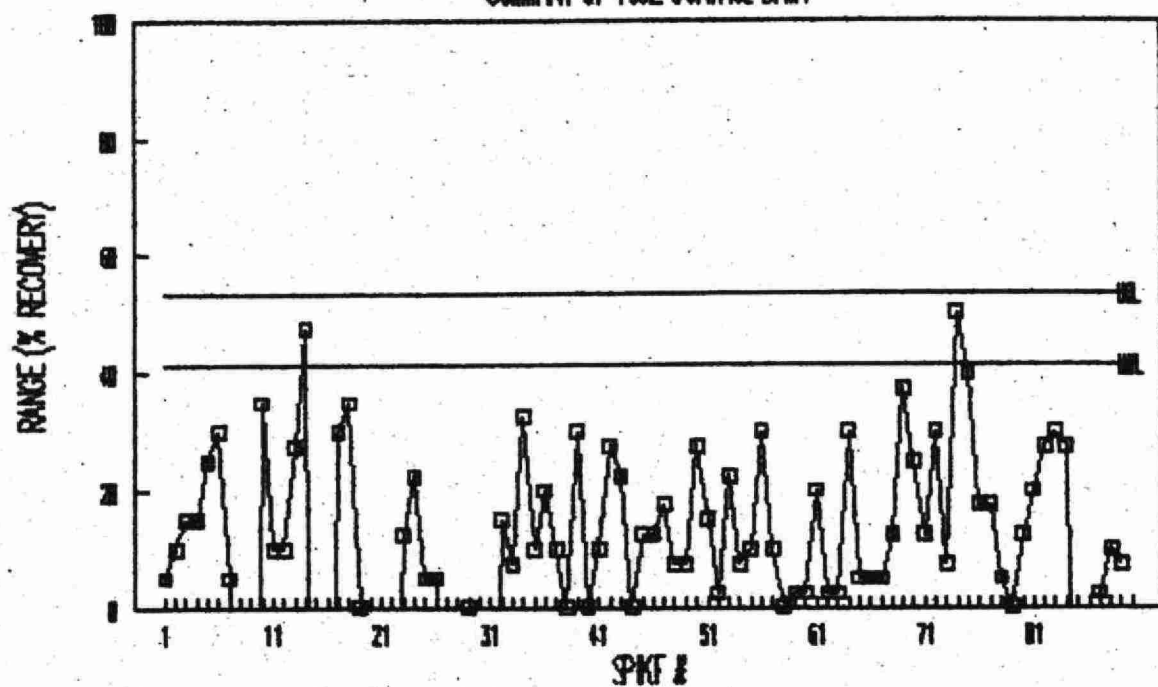
PSAOC: HEPT

SUMMARY OF 1992 CONTROL DATA



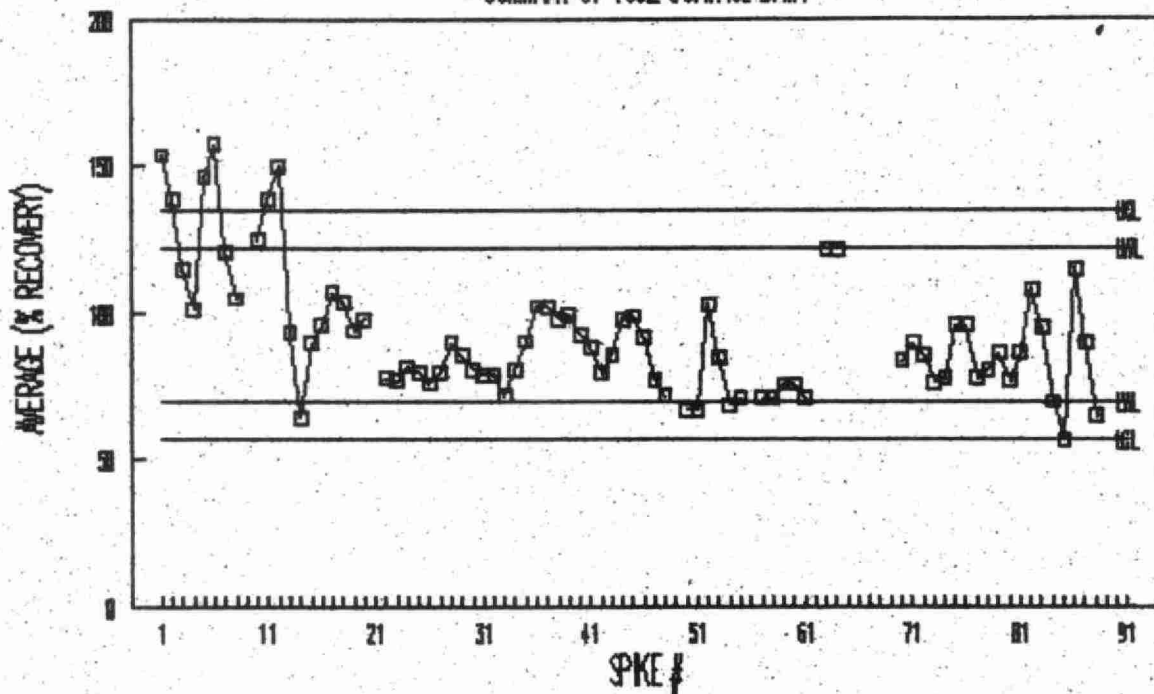
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SUMMARY OF 1992 CONTROL DATA



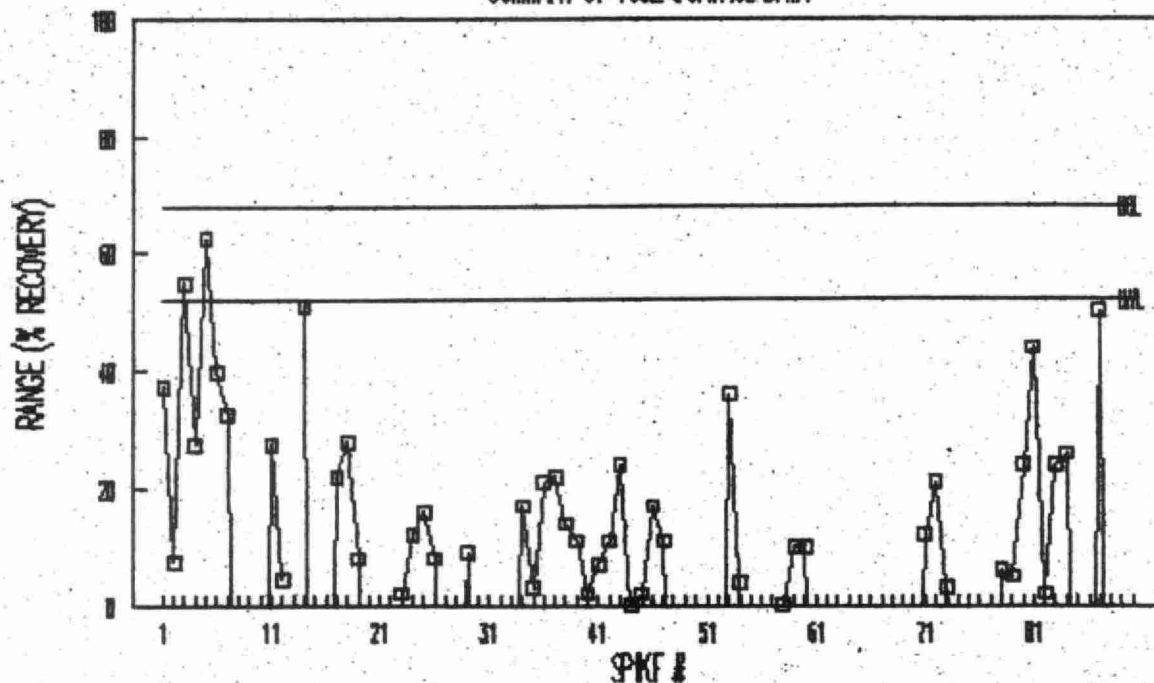
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SUMMARY OF 1992 CONTROL DATA



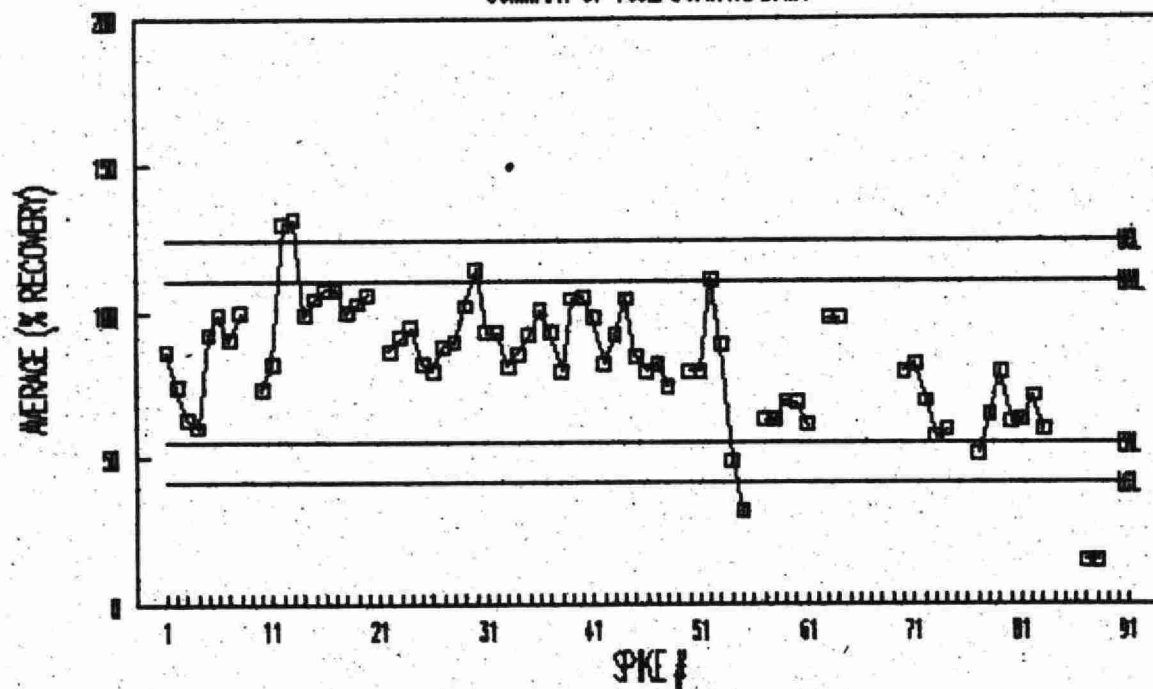
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SUMMARY OF 1992 CONTROL DATA



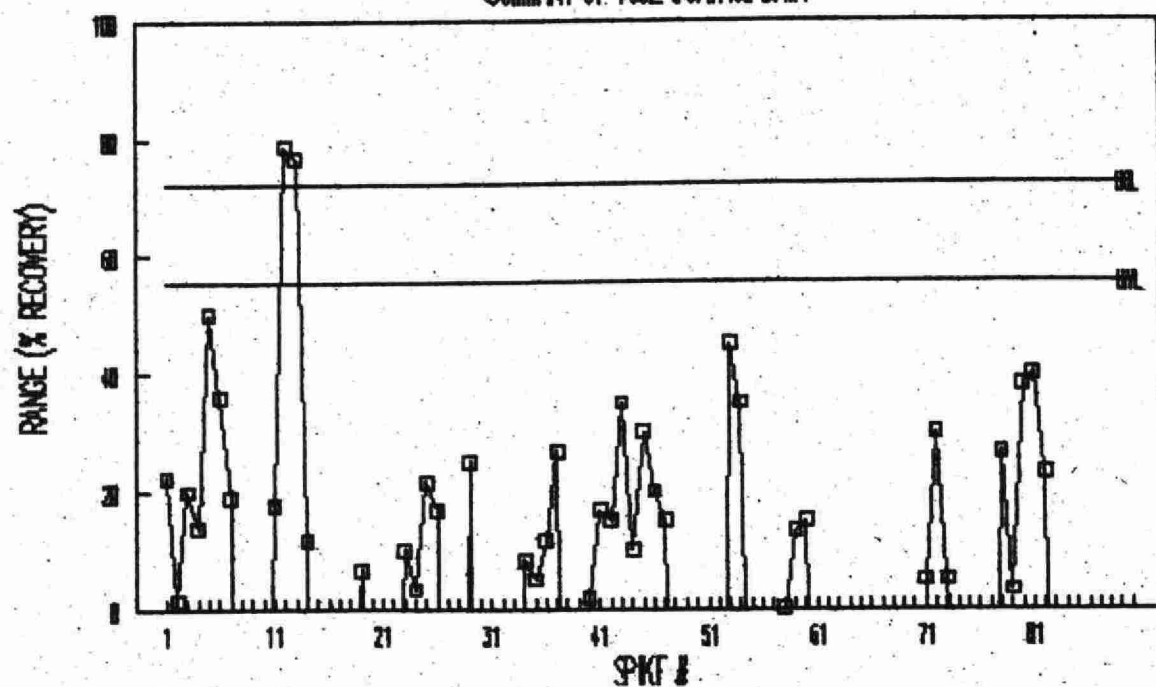
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SUMMARY OF 1992 CONTROL DATA



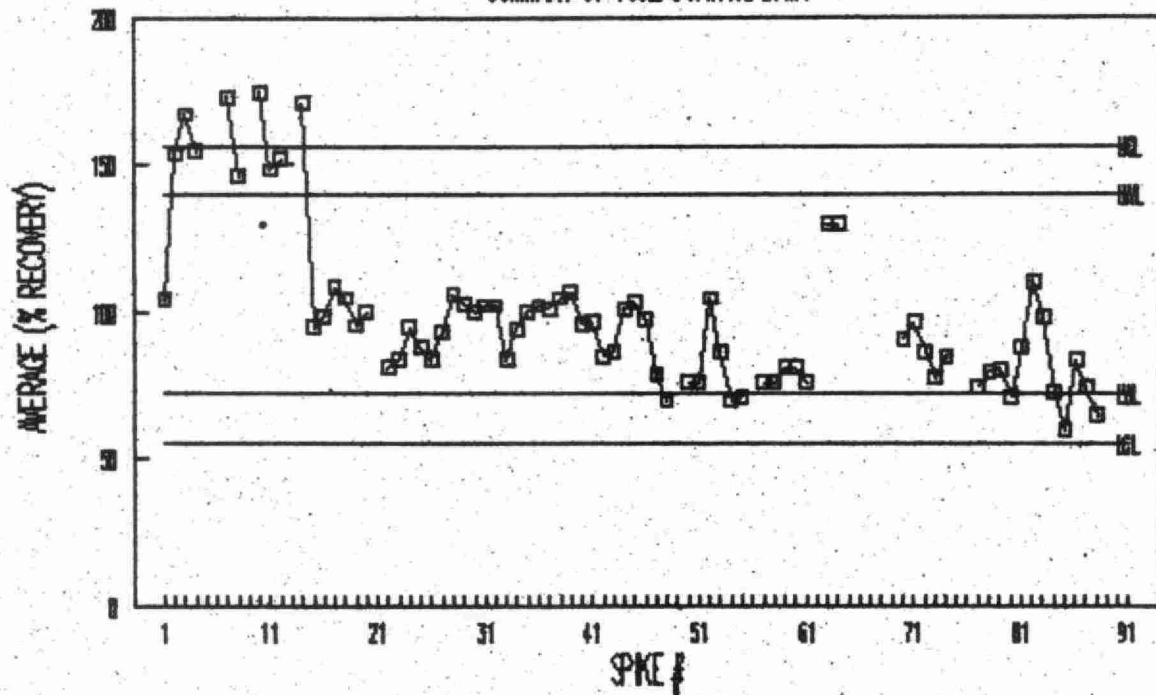
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SUMMARY OF 1992 CONTROL DATA



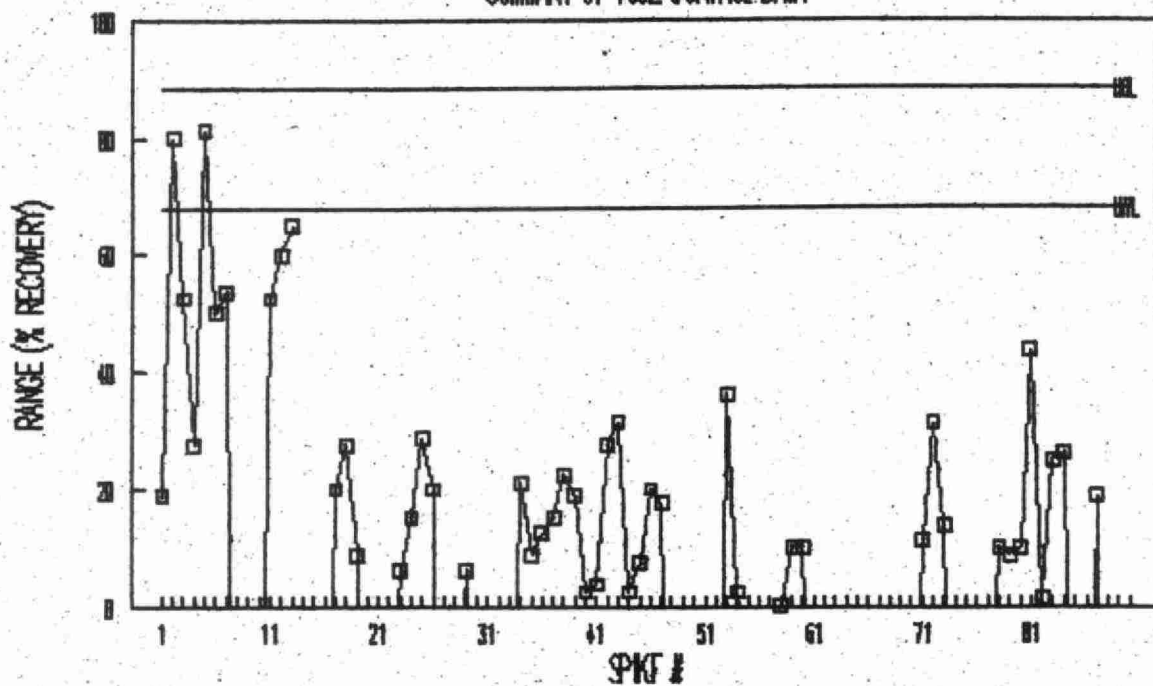
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SUMMARY OF 1992 CONTROL DATA



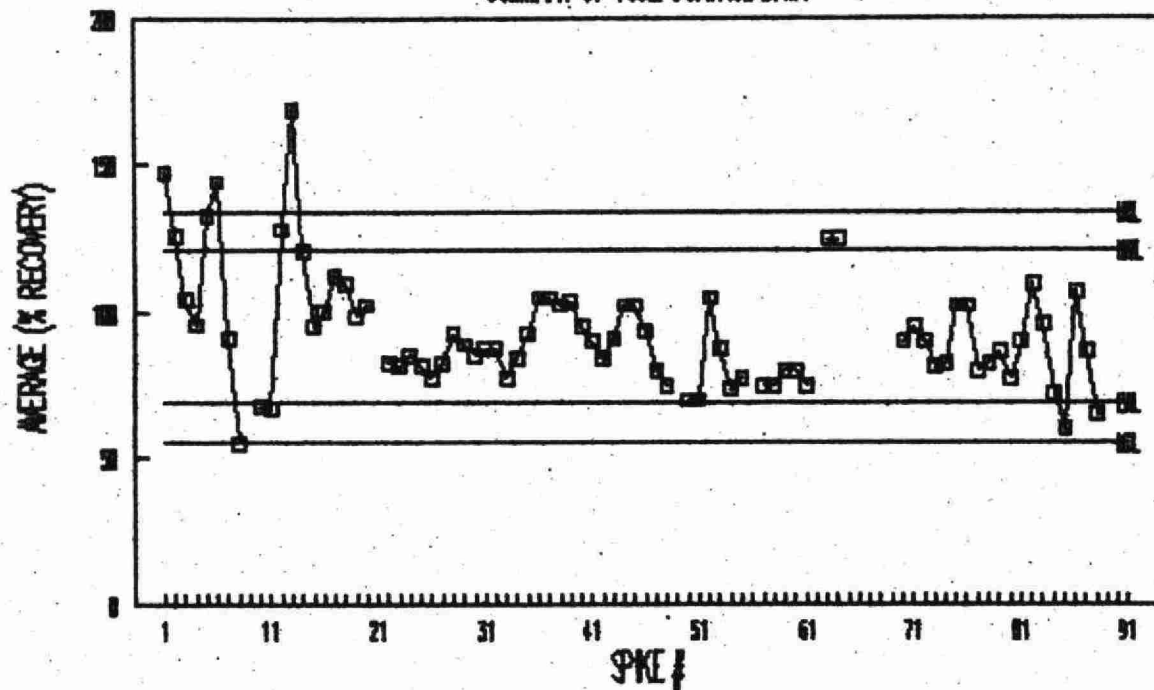
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SUMMARY OF 1992 CONTROL DATA



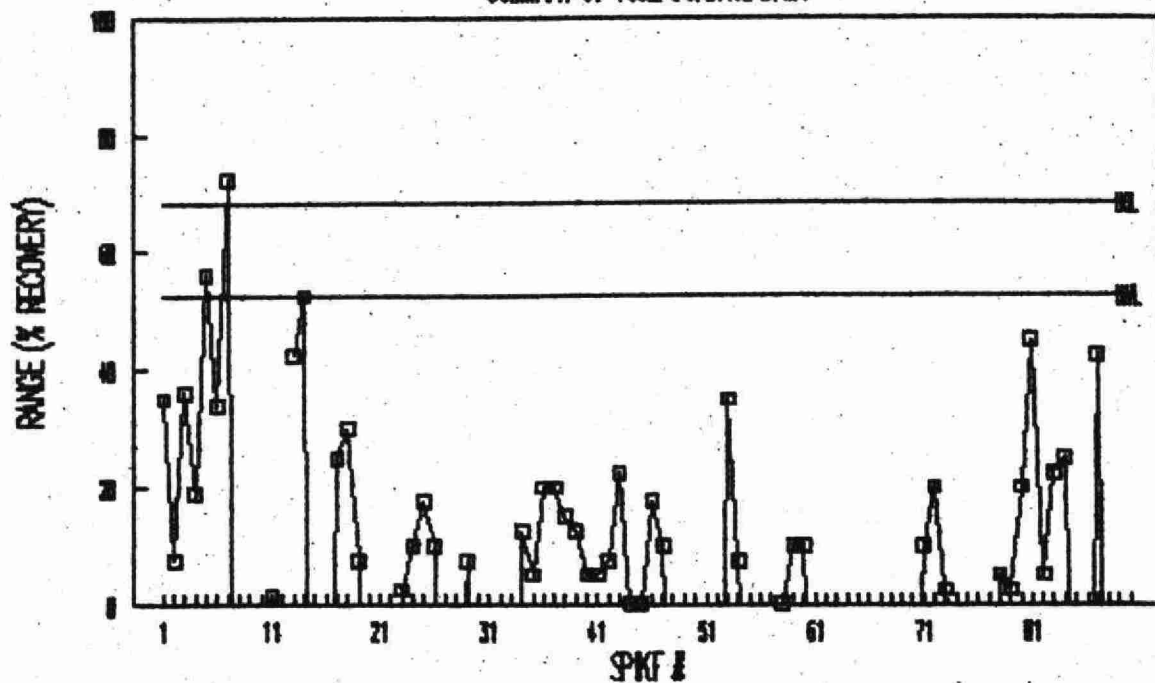
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SUMMARY OF 1992 CONTROL DATA



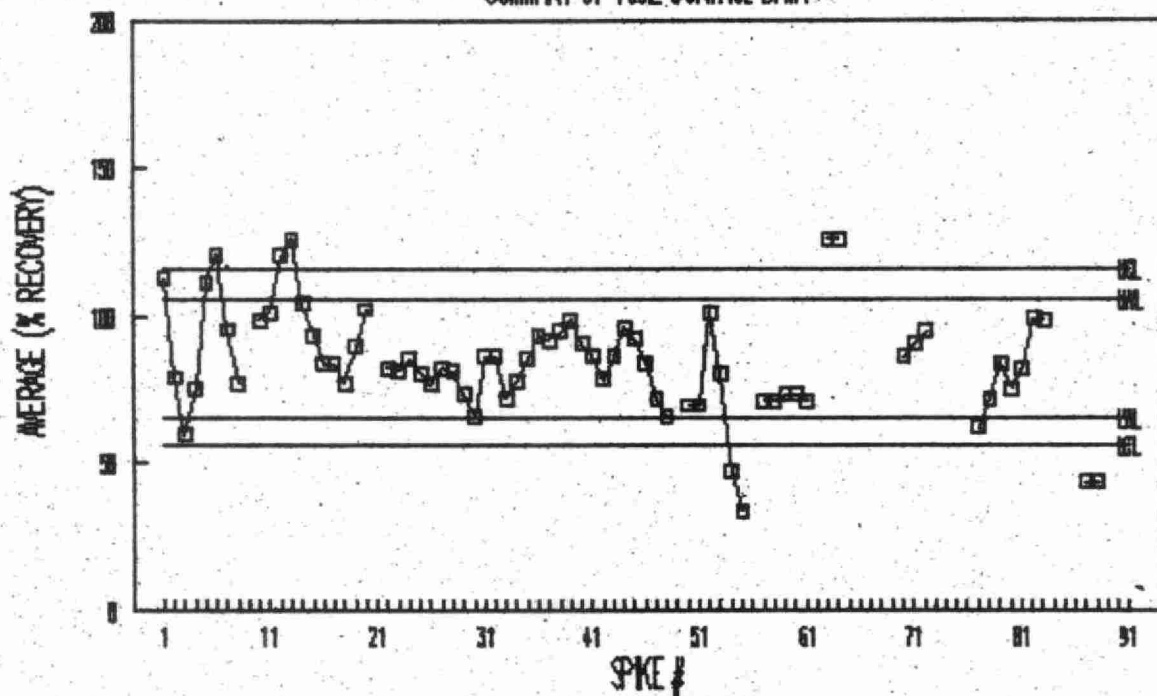
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SUMMARY OF 1992 CONTROL DATA



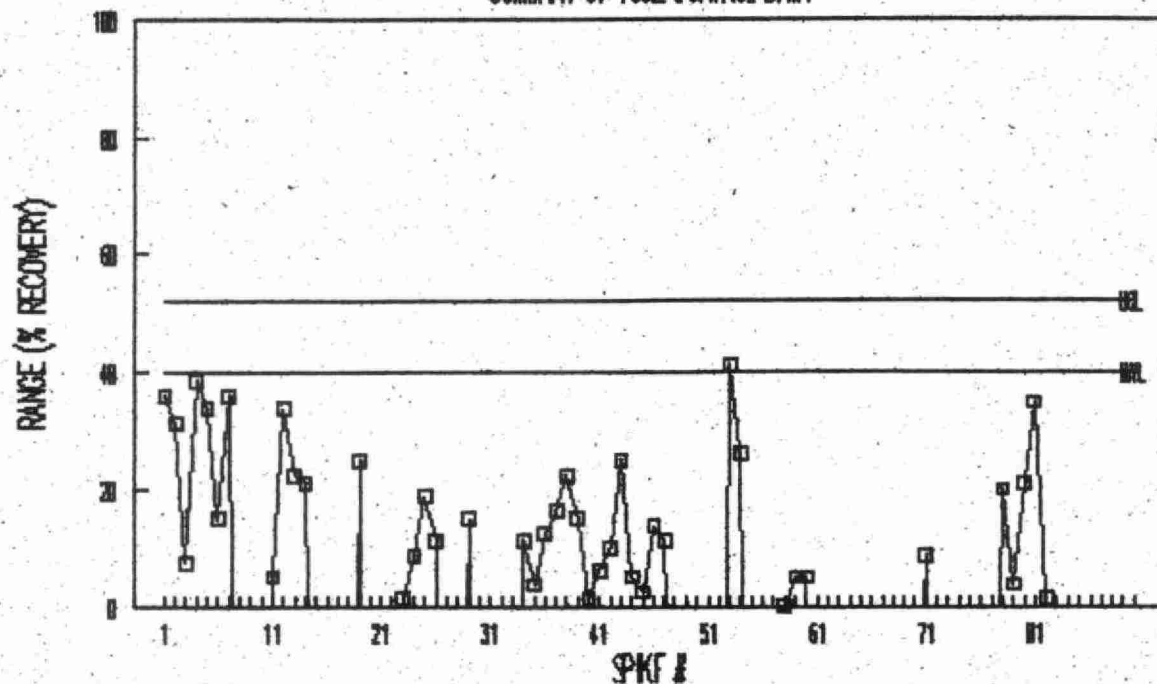
PSAOC: END2

SUMMARY OF 1992 CONTROL DATA



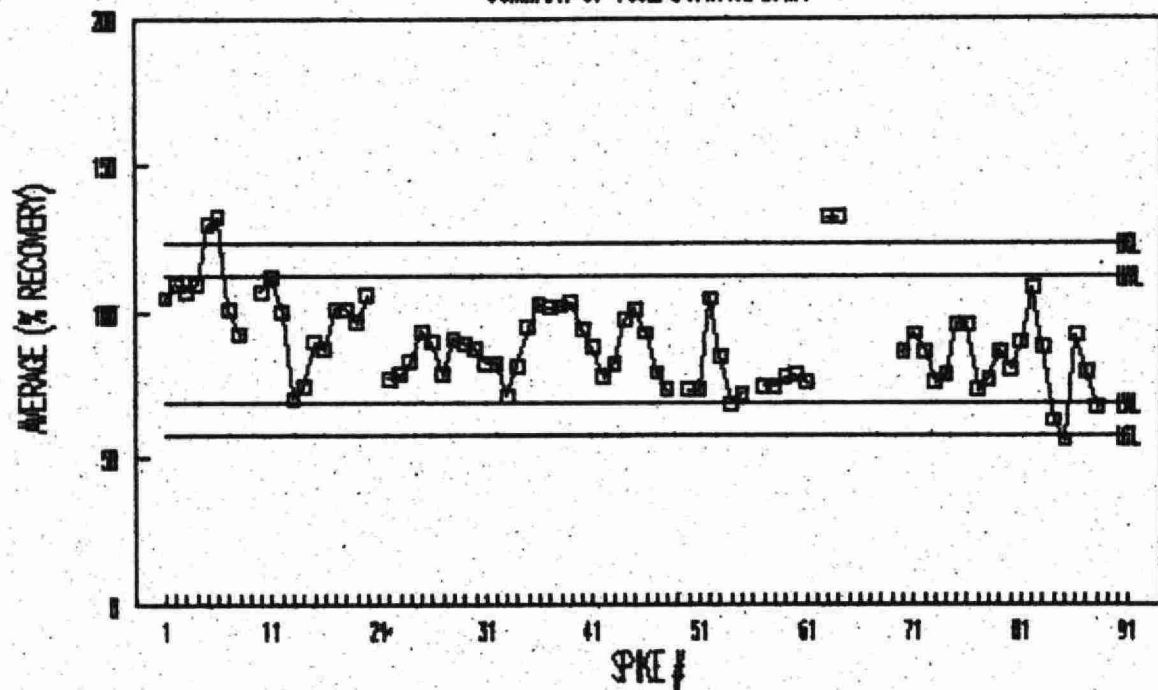
PSAOC: END2

SUMMARY OF 1992 CONTROL DATA



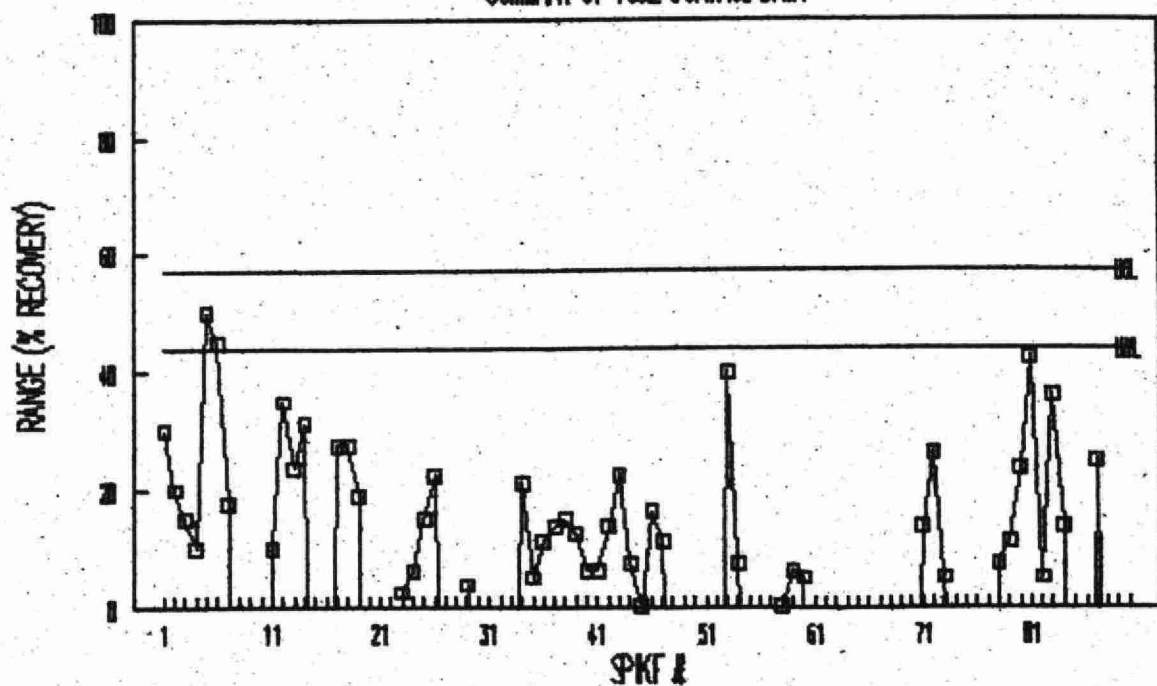
PSAOC: DIEL

SUMMARY OF 1992 CONTROL DATA



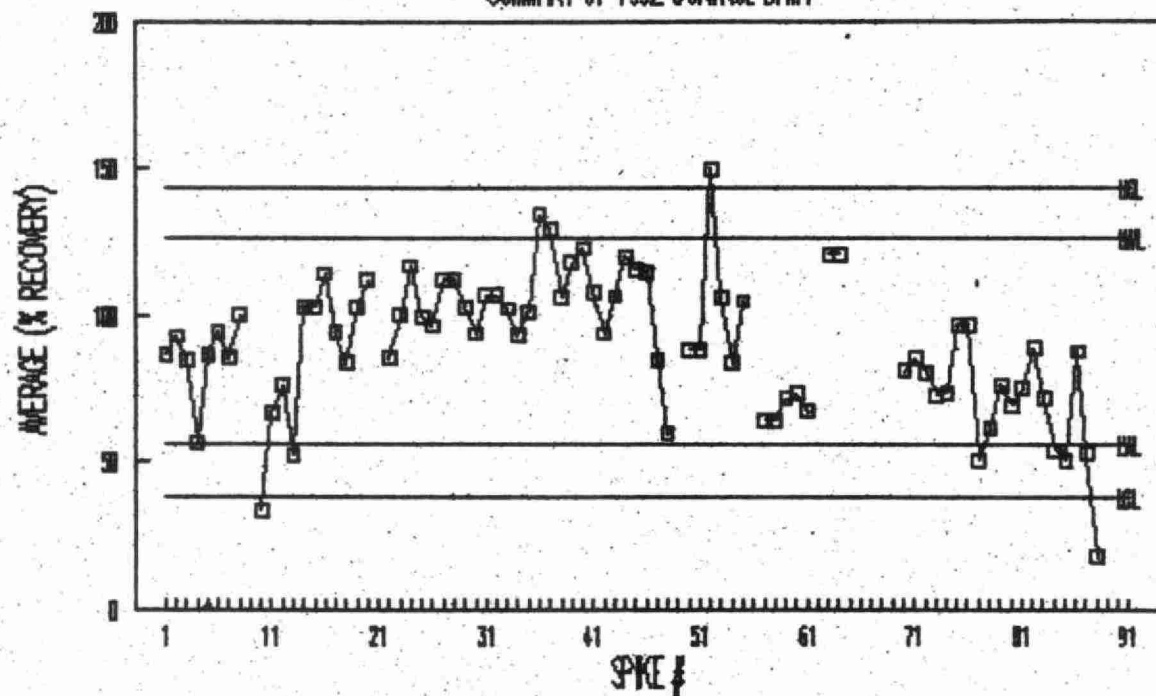
PSAOC: DIEL

SUMMARY OF 1992 CONTROL DATA



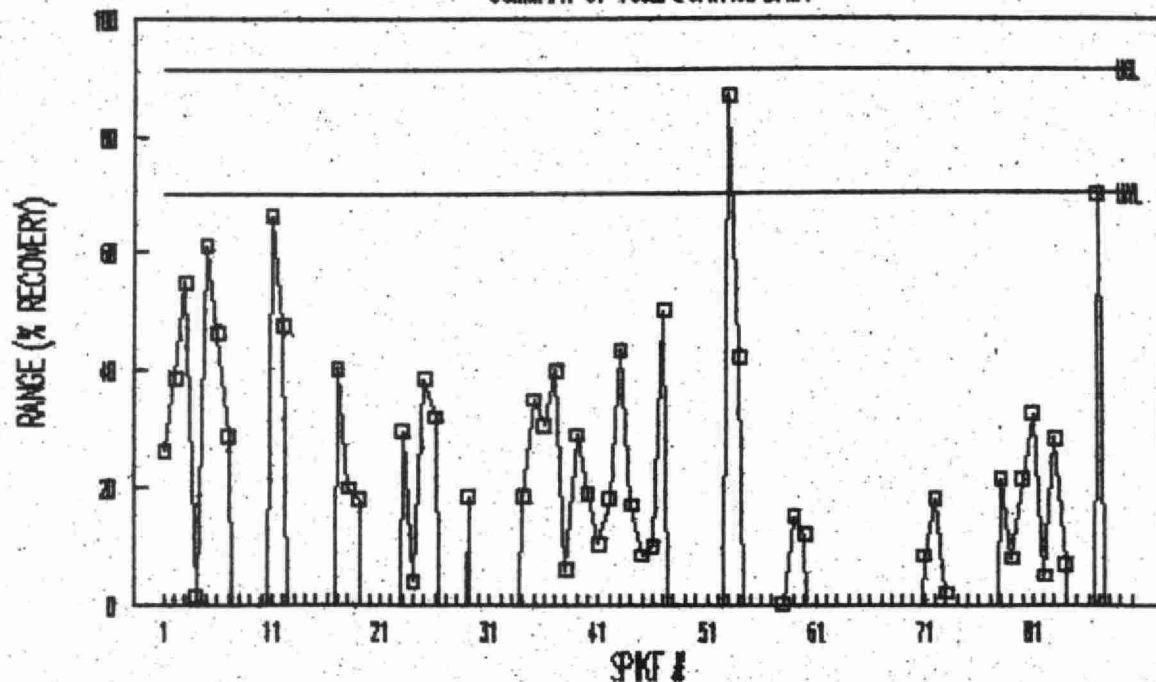
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SUMMARY OF 1992 CONTROL DATA



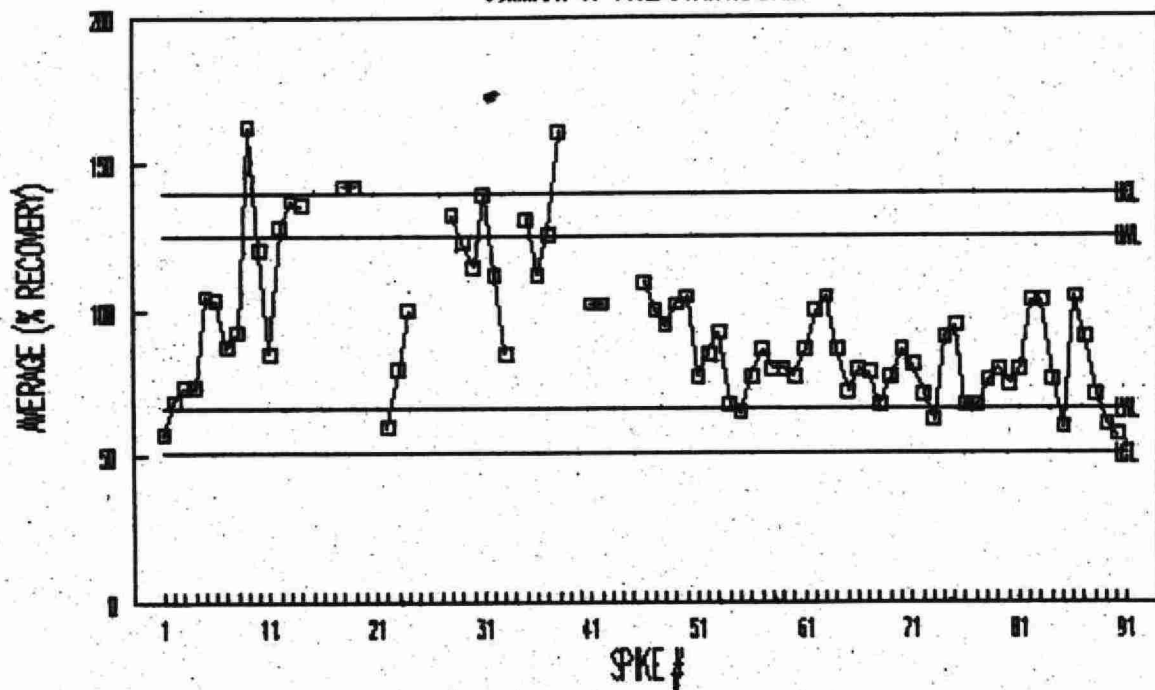
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SUMMARY OF 1992 CONTROL DATA



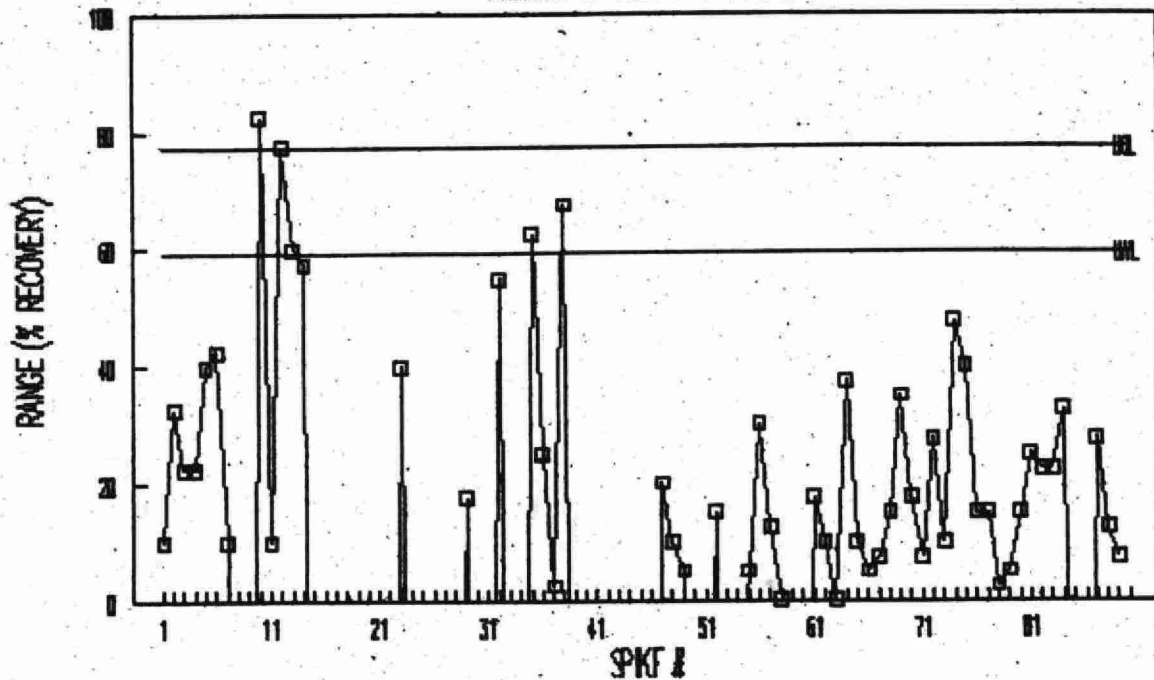
PSAOC: ALDR

SUMMARY OF 1992 CONTROL DATA



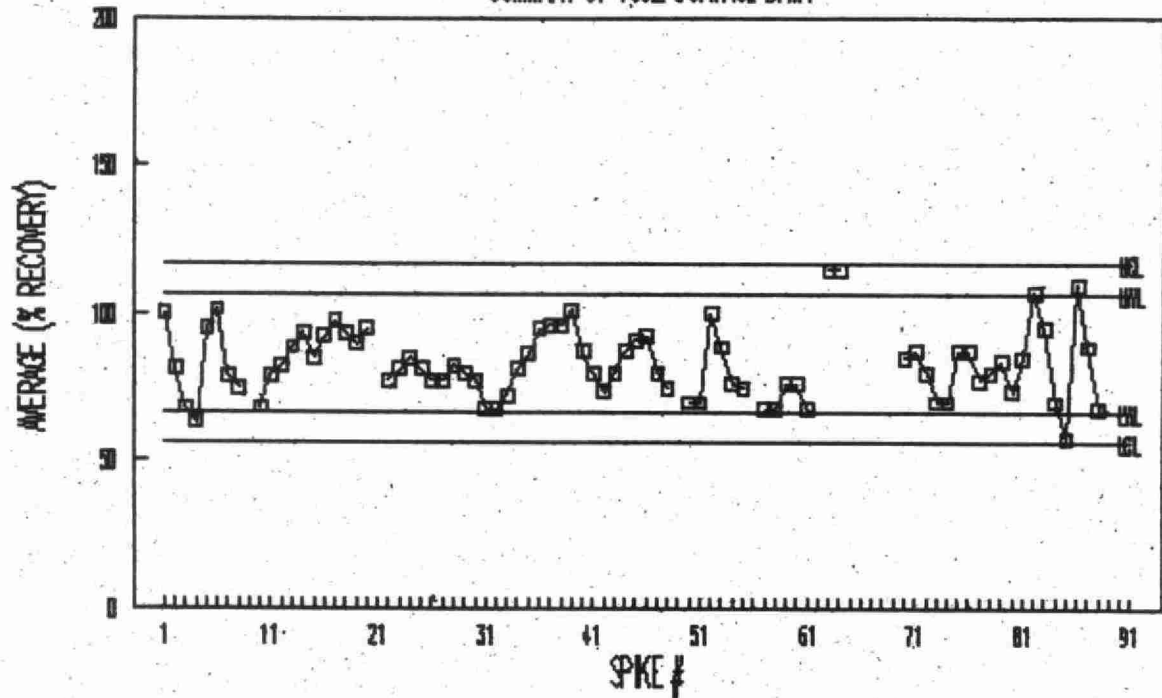
PSAOC: ALDR

SUMMARY OF 1992 CONTROL DATA



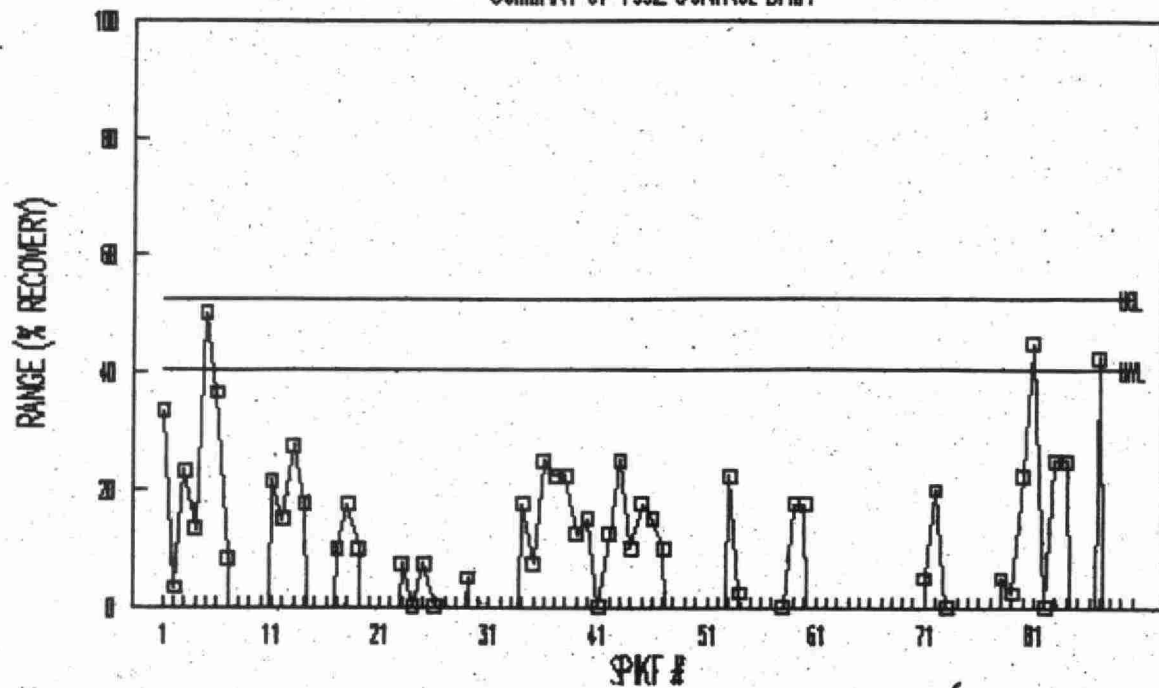
PSAOC: BHCG

SUMMARY OF 1992 CONTROL DATA



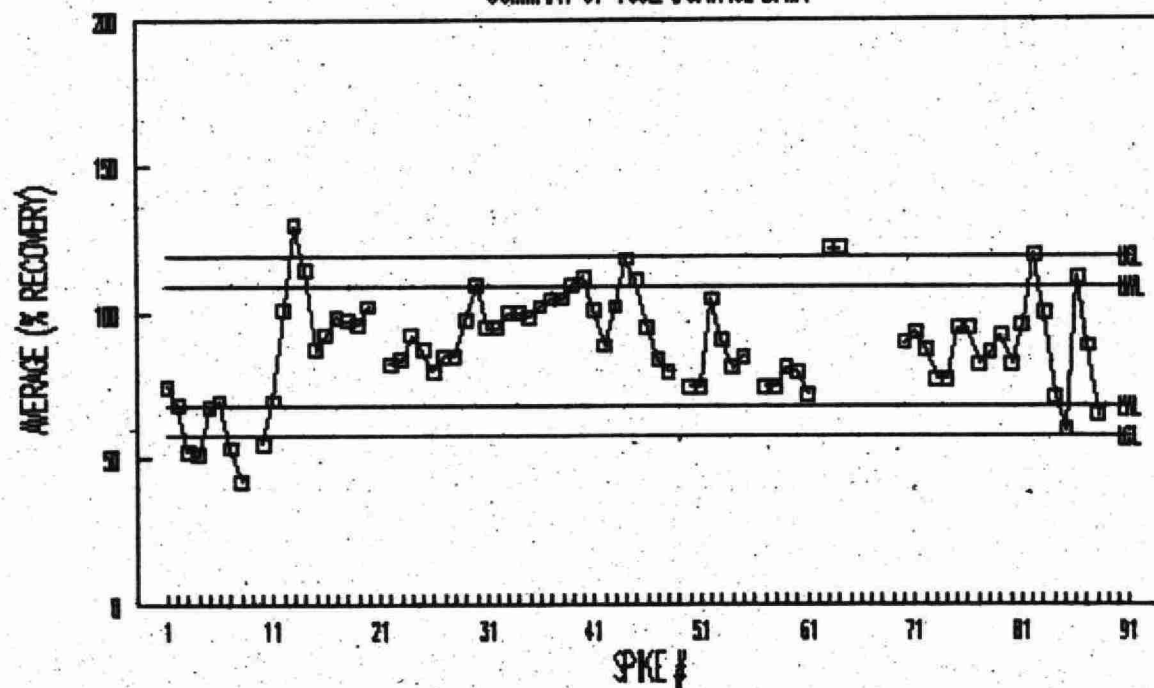
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SUMMARY OF 1992 CONTROL DATA



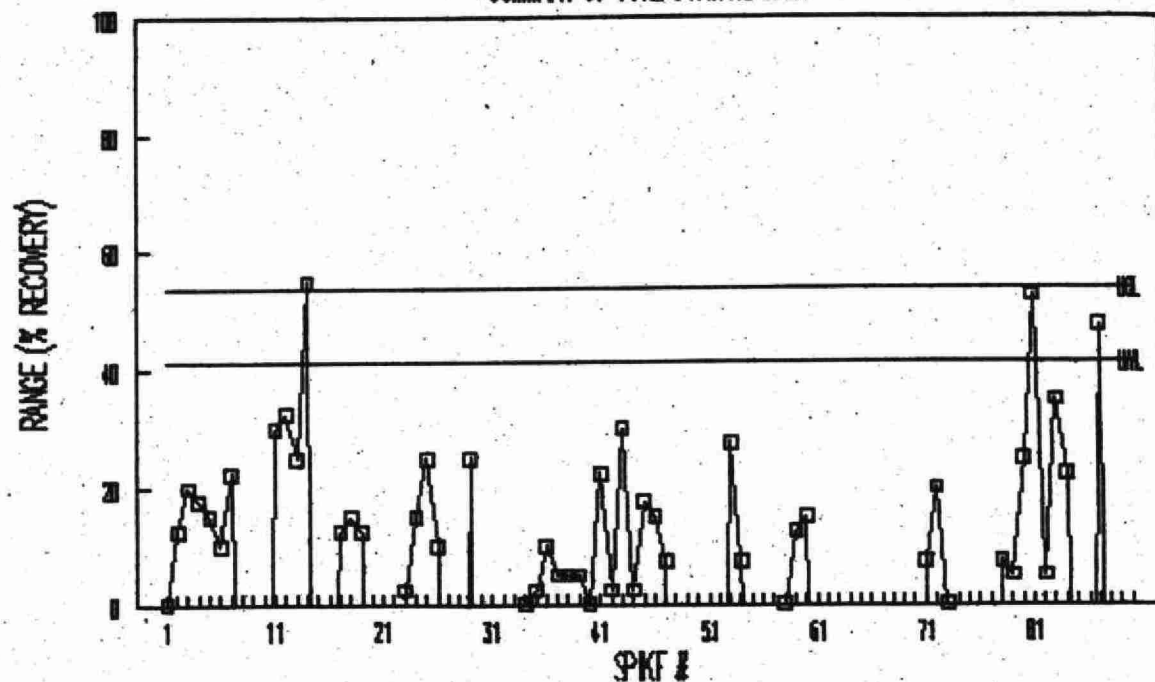
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SUMMARY OF 1992 CONTROL DATA



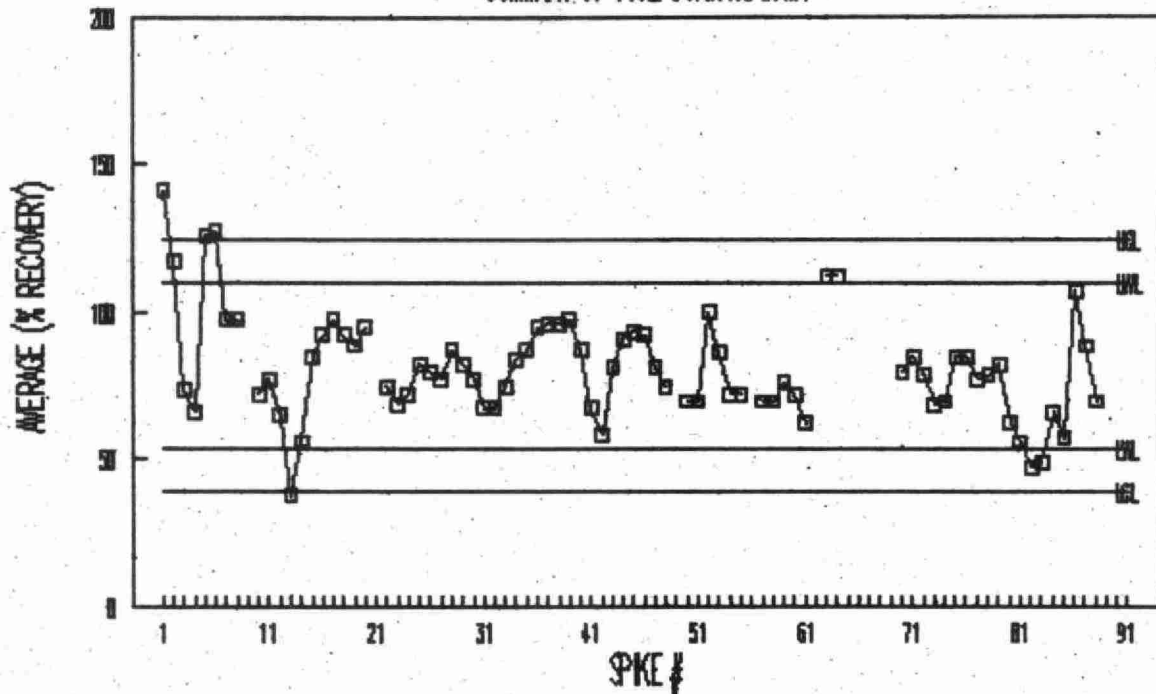
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SUMMARY OF 1992 CONTROL DATA



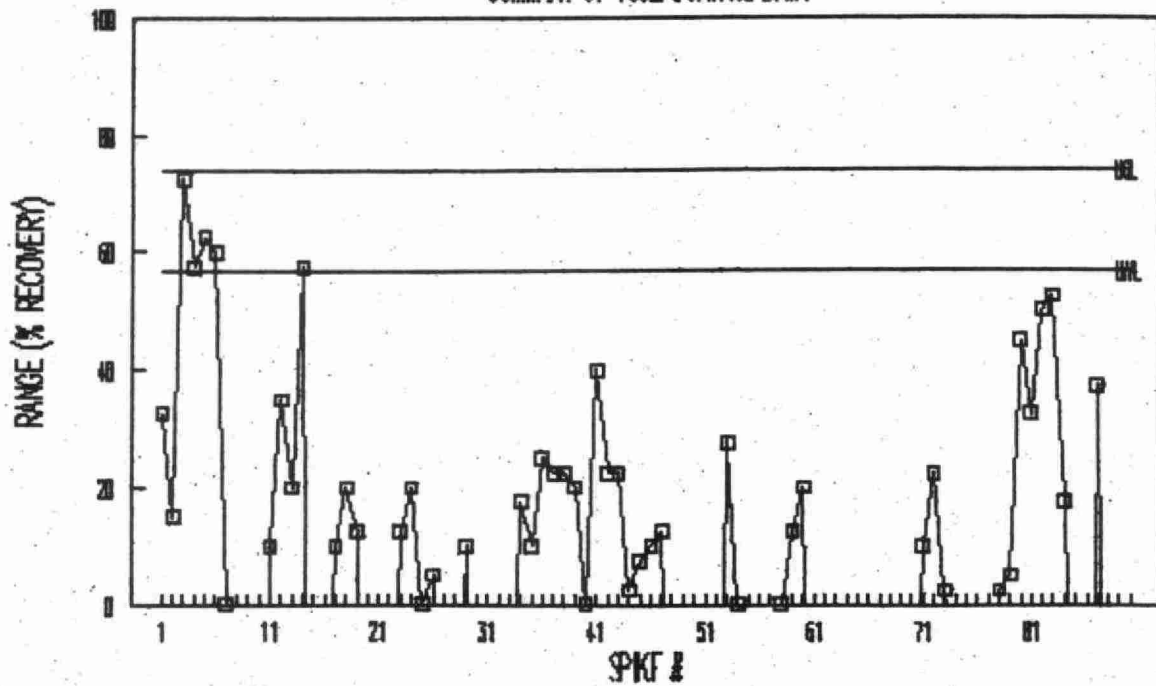
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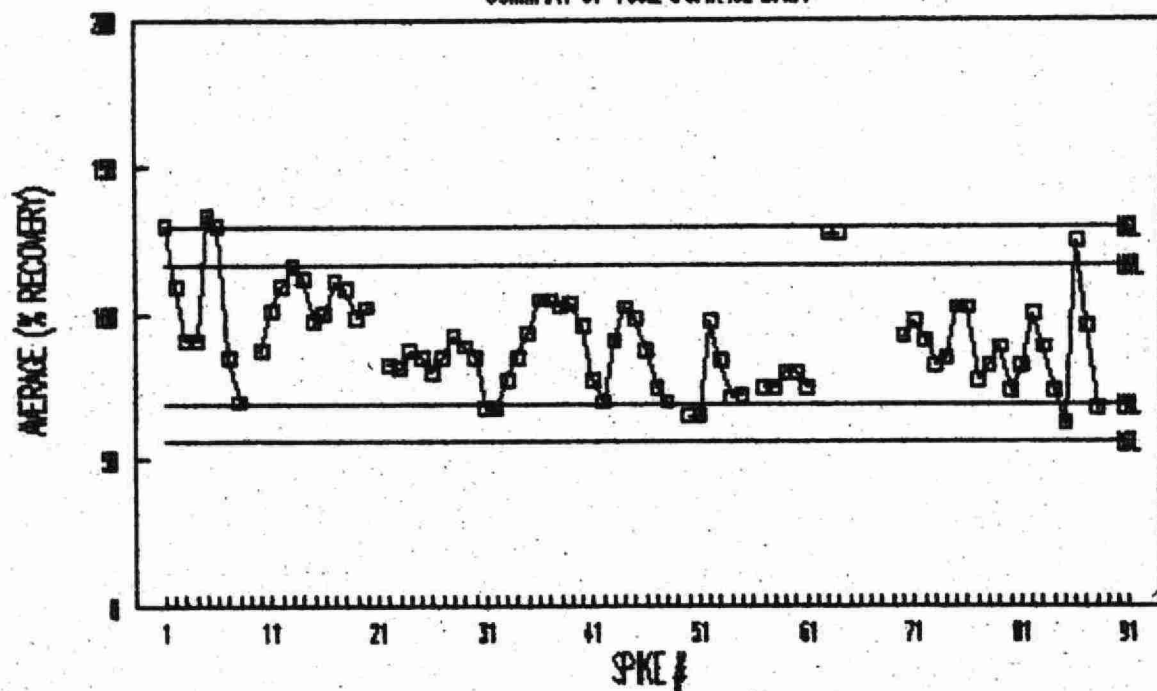
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SUMMARY OF 1992 CONTROL DATA



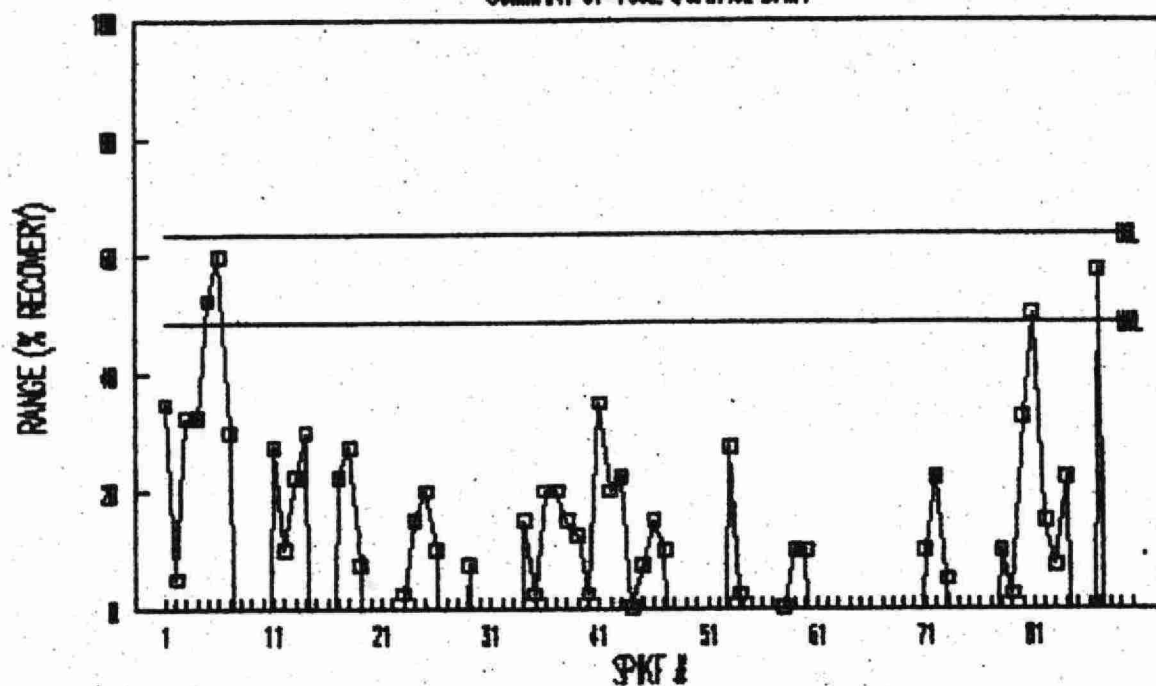
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SUMMARY OF 1992 CONTROL DATA



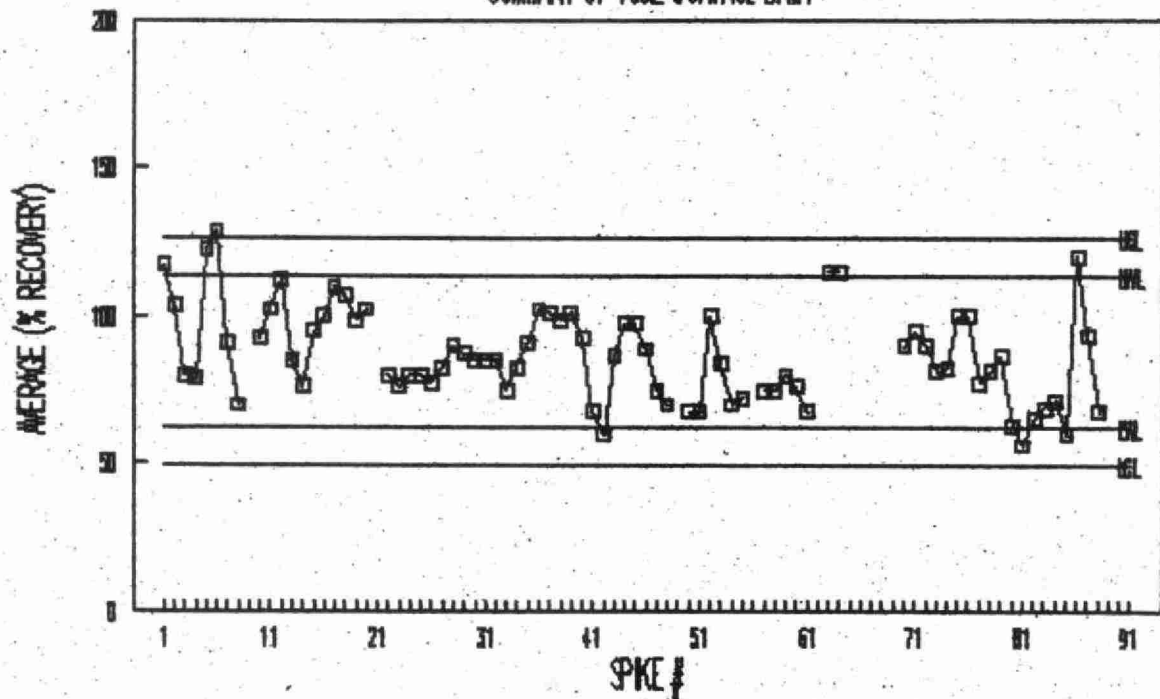
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SUMMARY OF 1992 CONTROL DATA



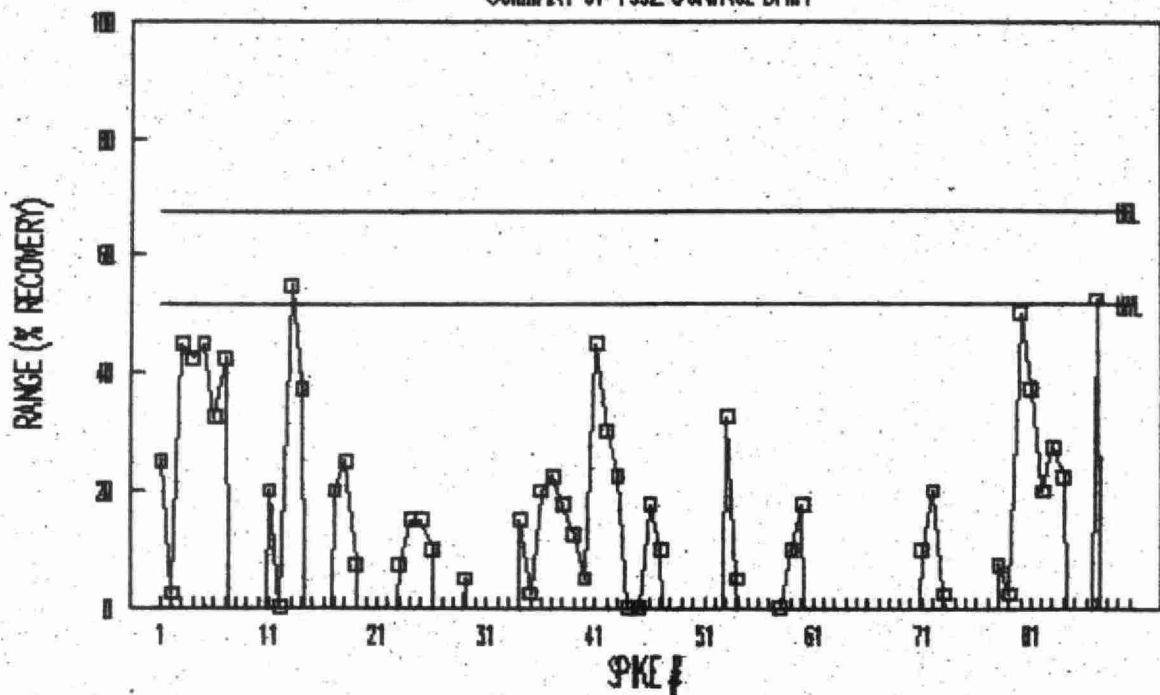
PSAOC: CHLA

SUMMARY OF 1992 CONTROL DATA



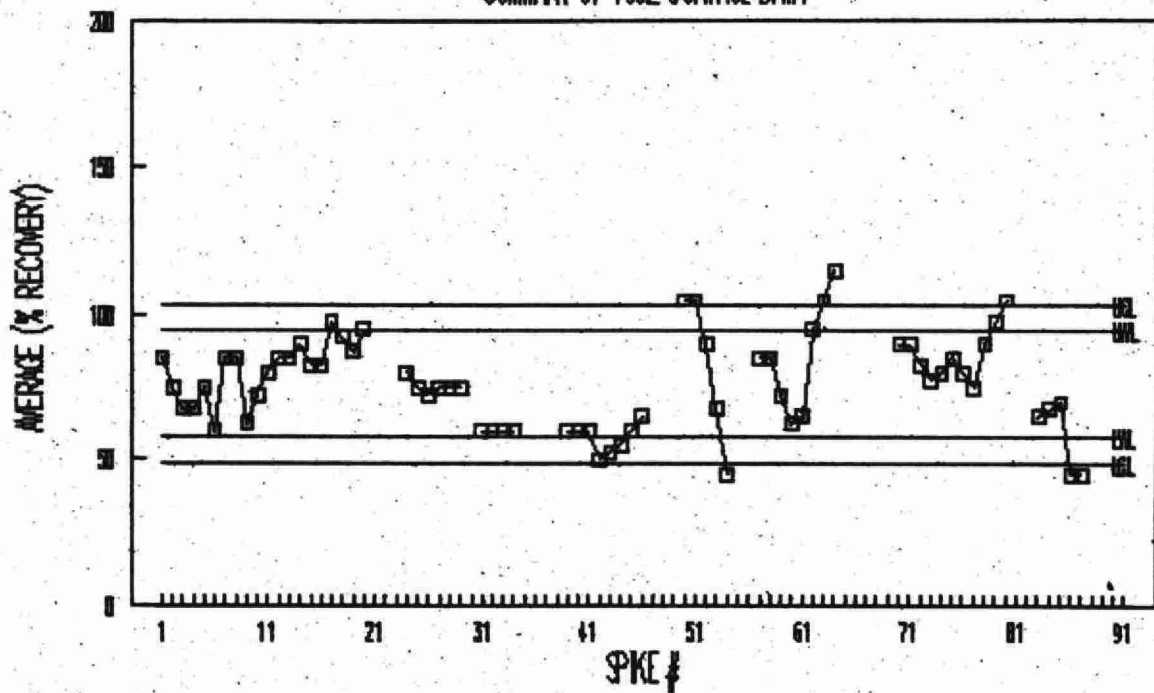
PSAOC: CHLA

SUMMARY OF 1992 CONTROL DATA



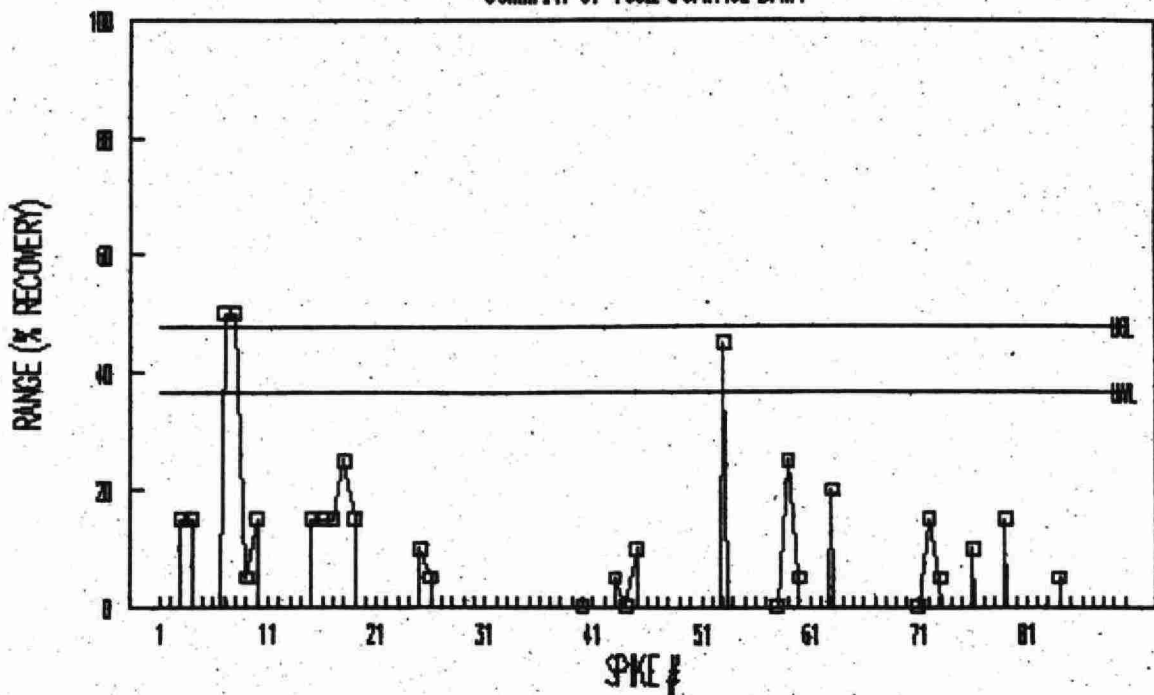
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SUMMARY OF 1992 CONTROL DATA



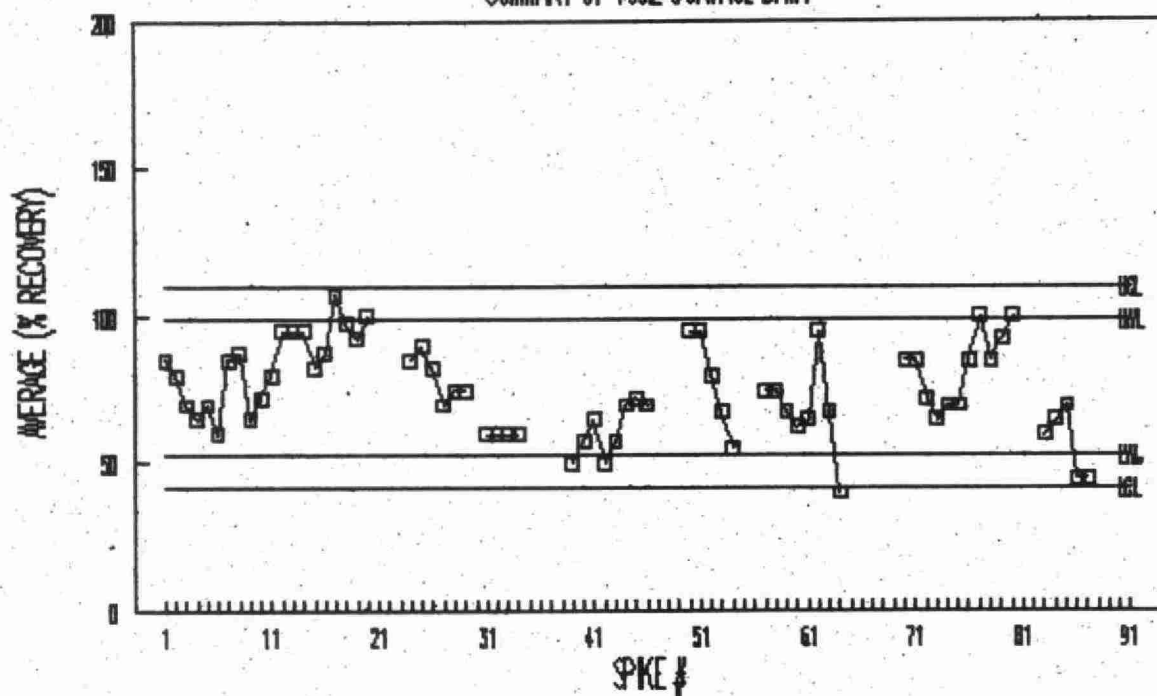
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SUMMARY OF 1992 CONTROL DATA



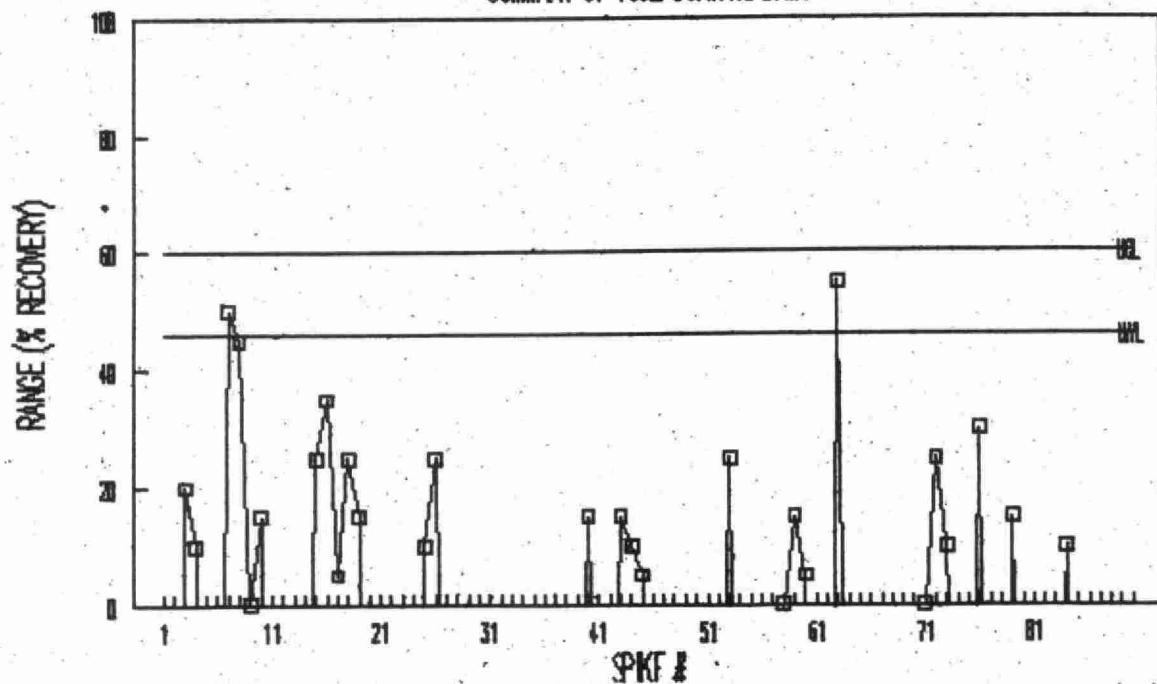
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SUMMARY OF 1992 CONTROL DATA



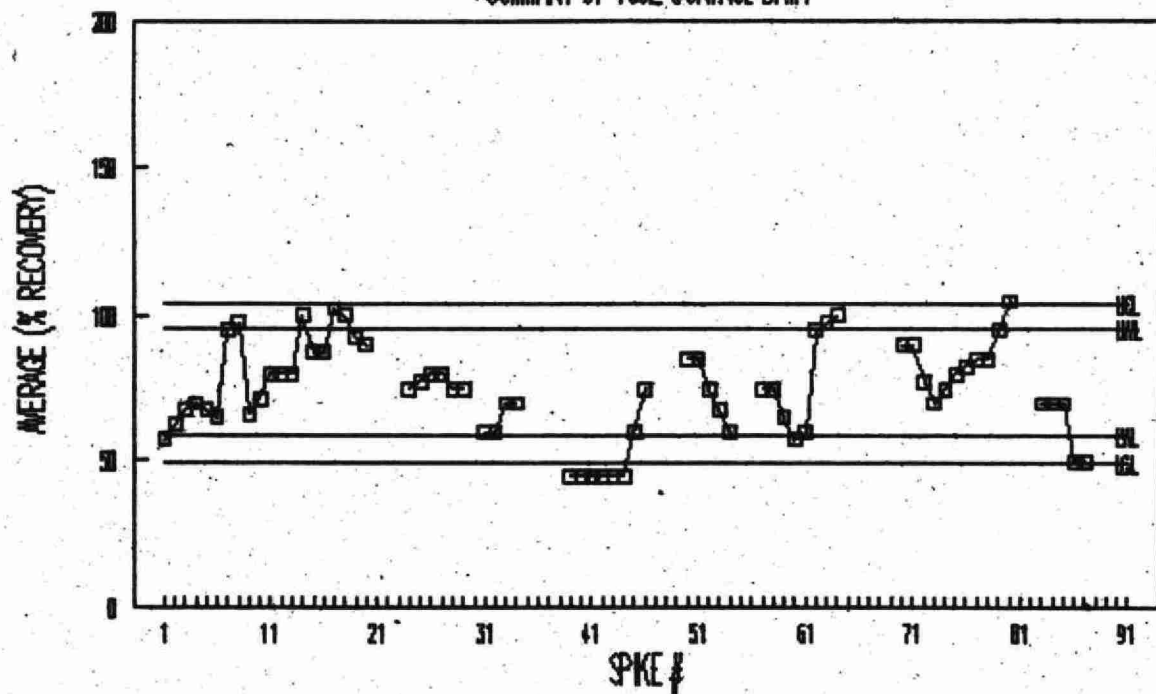
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SUMMARY OF 1992 CONTROL DATA



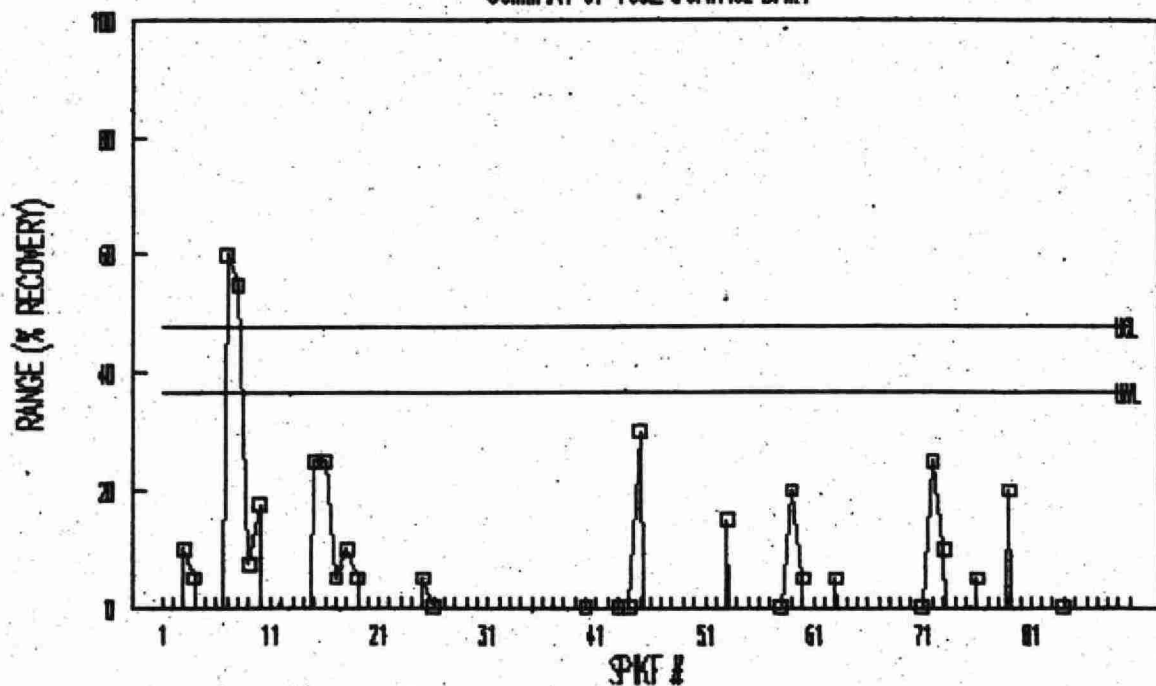
PSAOC: 123TCB

SUMMARY OF 1992 CONTROL DATA



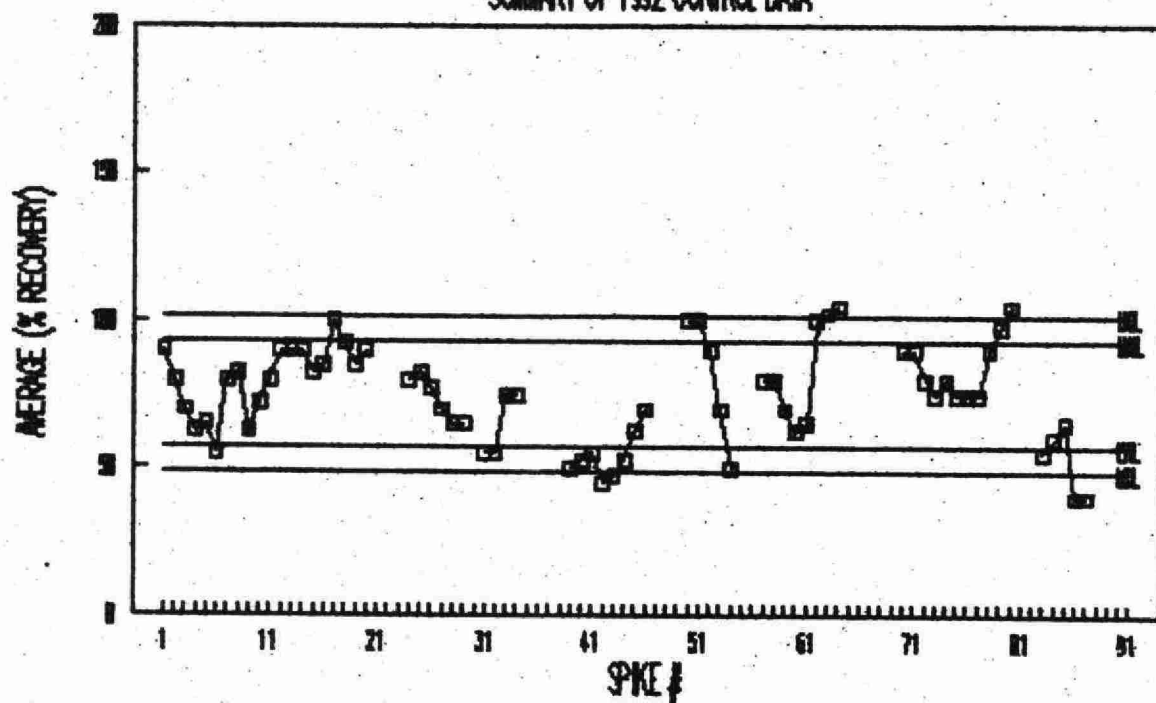
PSAOC: 123TCB

SUMMARY OF 1992 CONTROL DATA



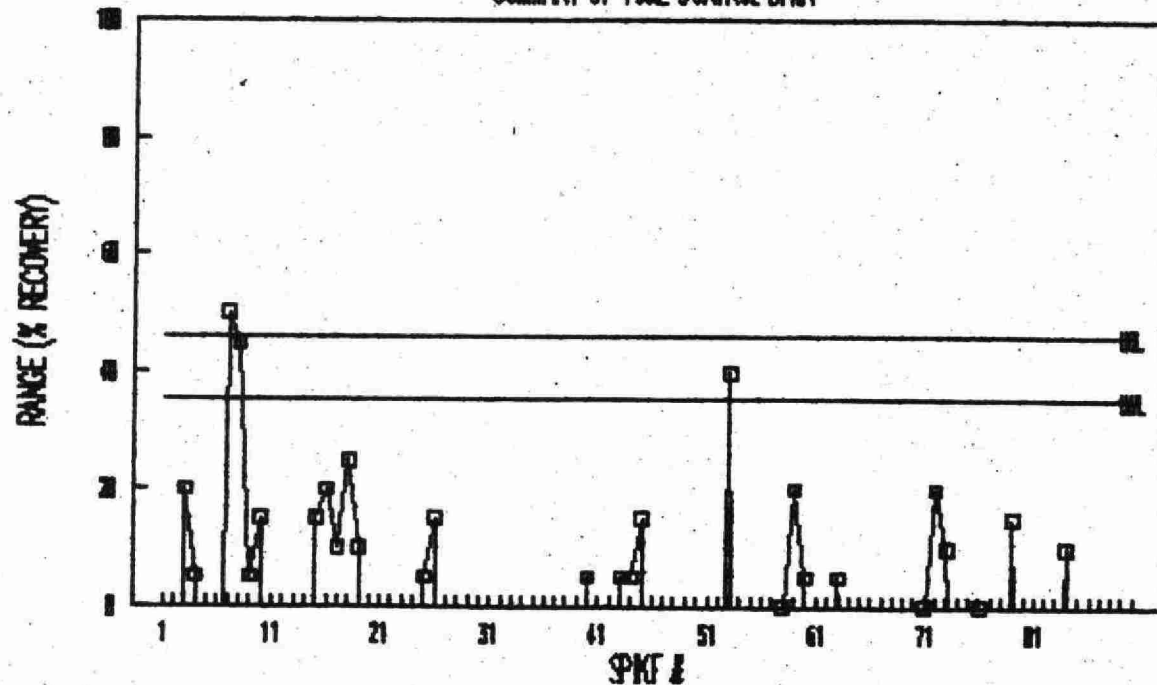
PSAOC: 1245CB

SUMMARY OF 1992 CONTROL DATA



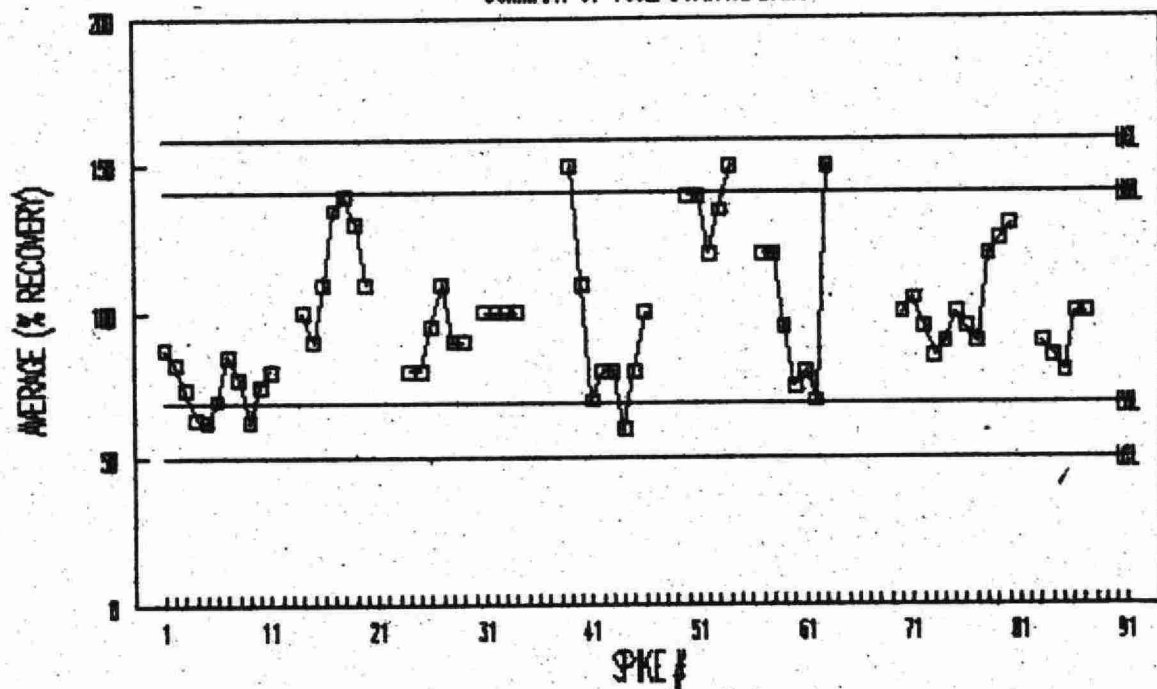
PSAOC: 1245CB

SUMMARY OF 1992 CONTROL DATA



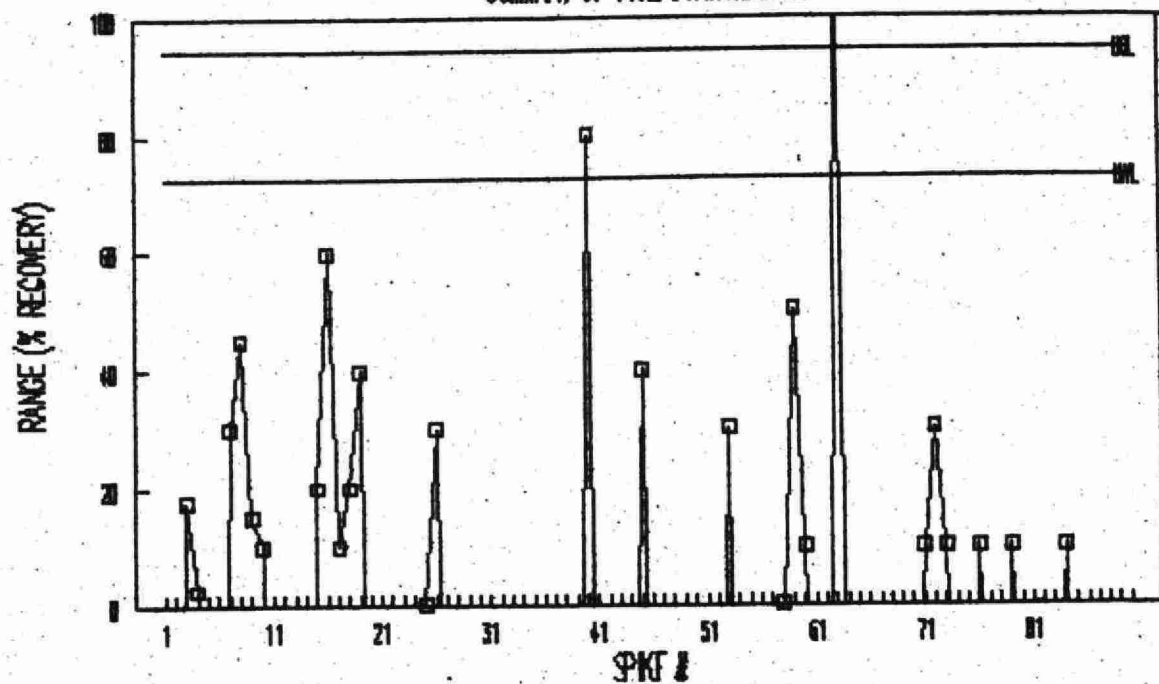
PSAOC: 124TCB

SUMMARY OF 1992 CONTROL DATA



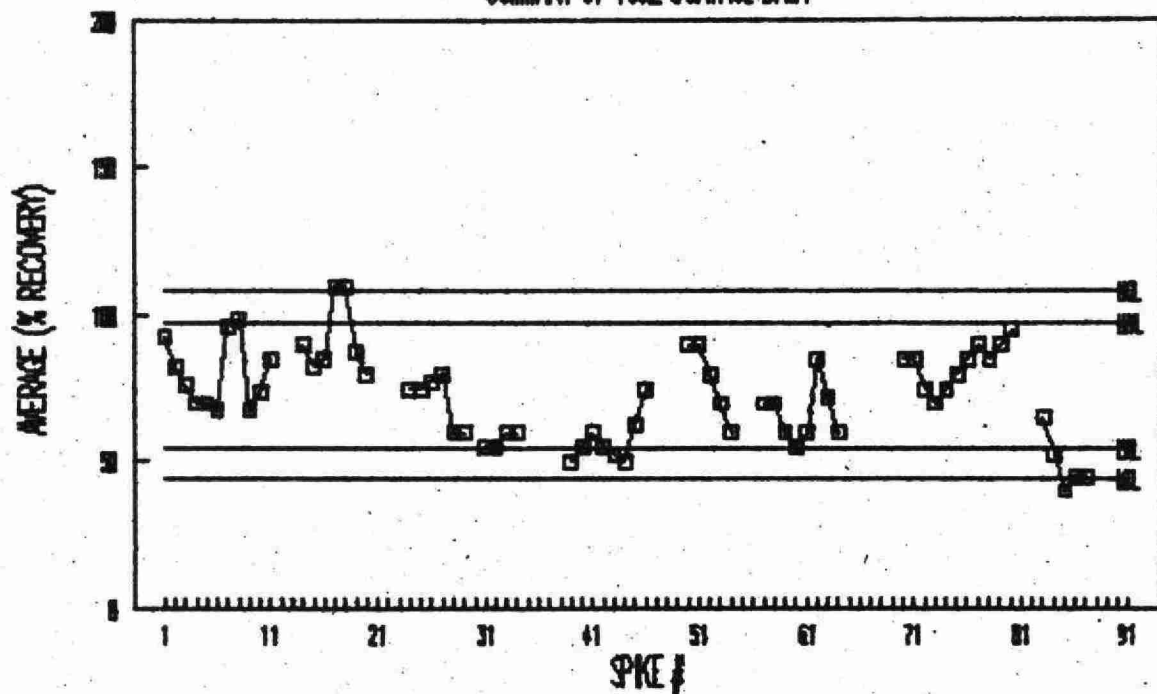
PSAOC: 124TCB

SUMMARY OF 1992 CONTROL DATA



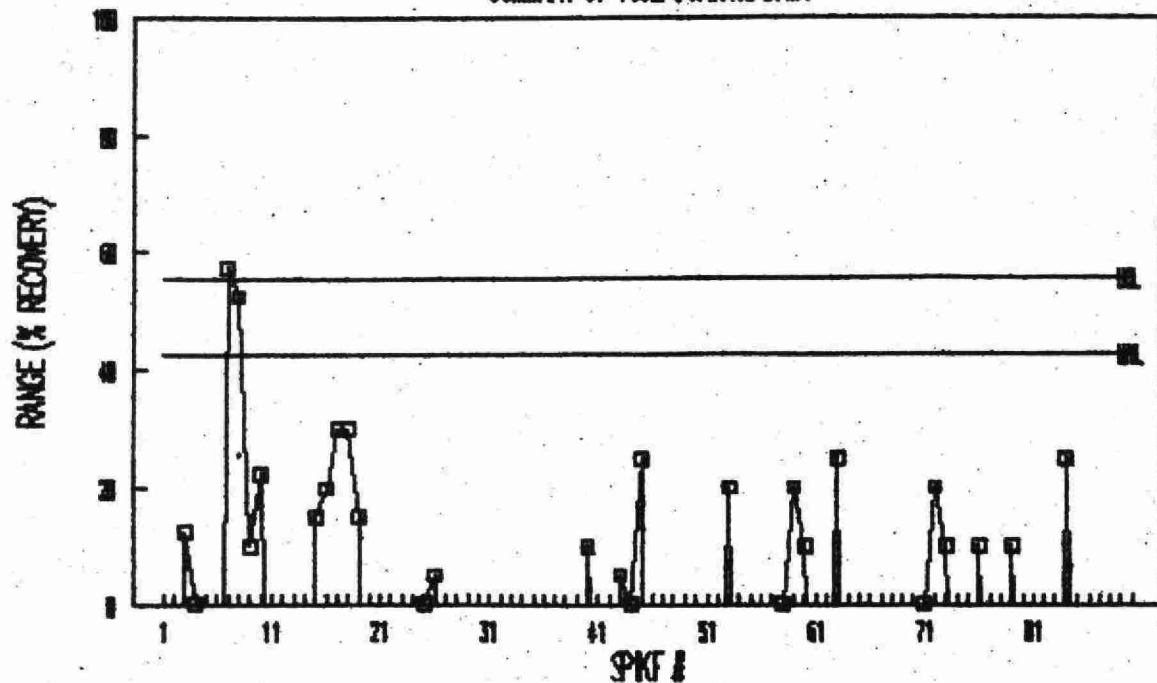
PSAOC: 135TCB

SUMMARY OF 1992 CONTROL DATA



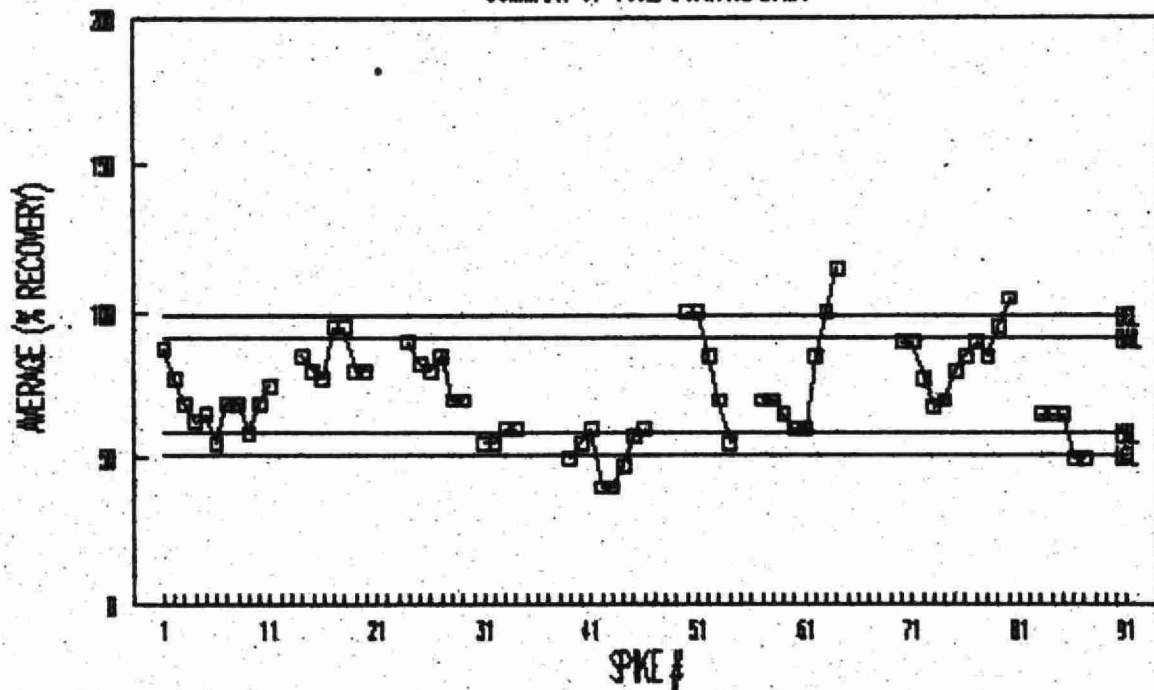
PSAOC: 135TCB

SUMMARY OF 1992 CONTROL DATA



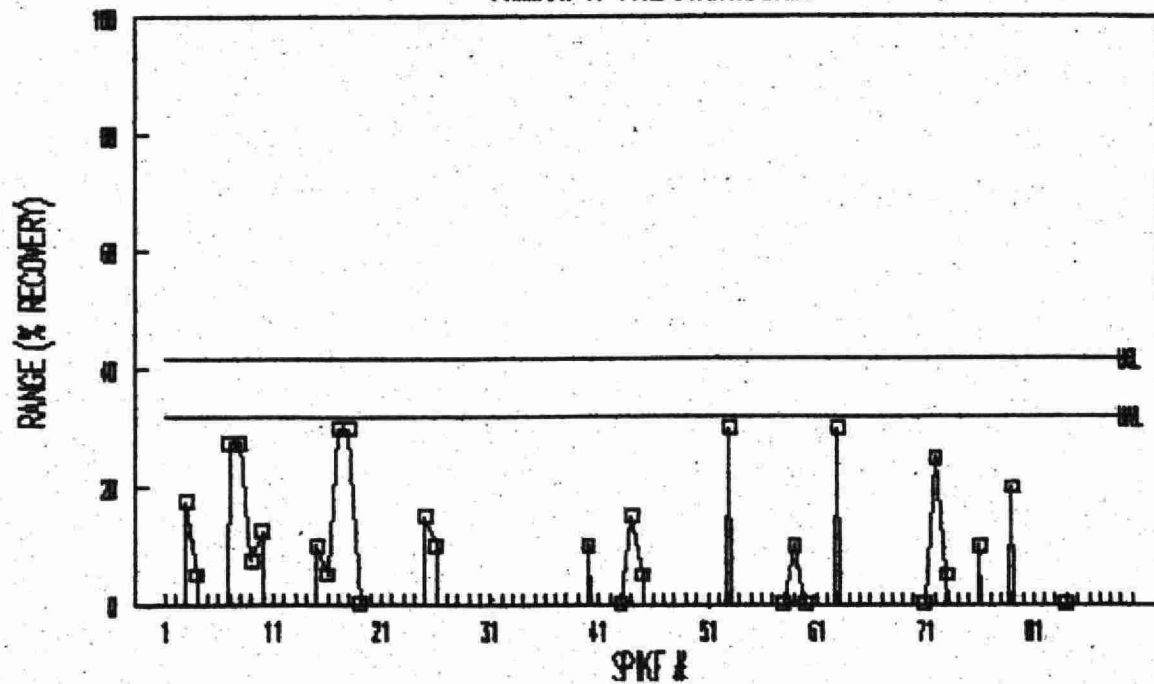
PSAOC: 236TCB

SUMMARY OF 1992 CONTROL DATA



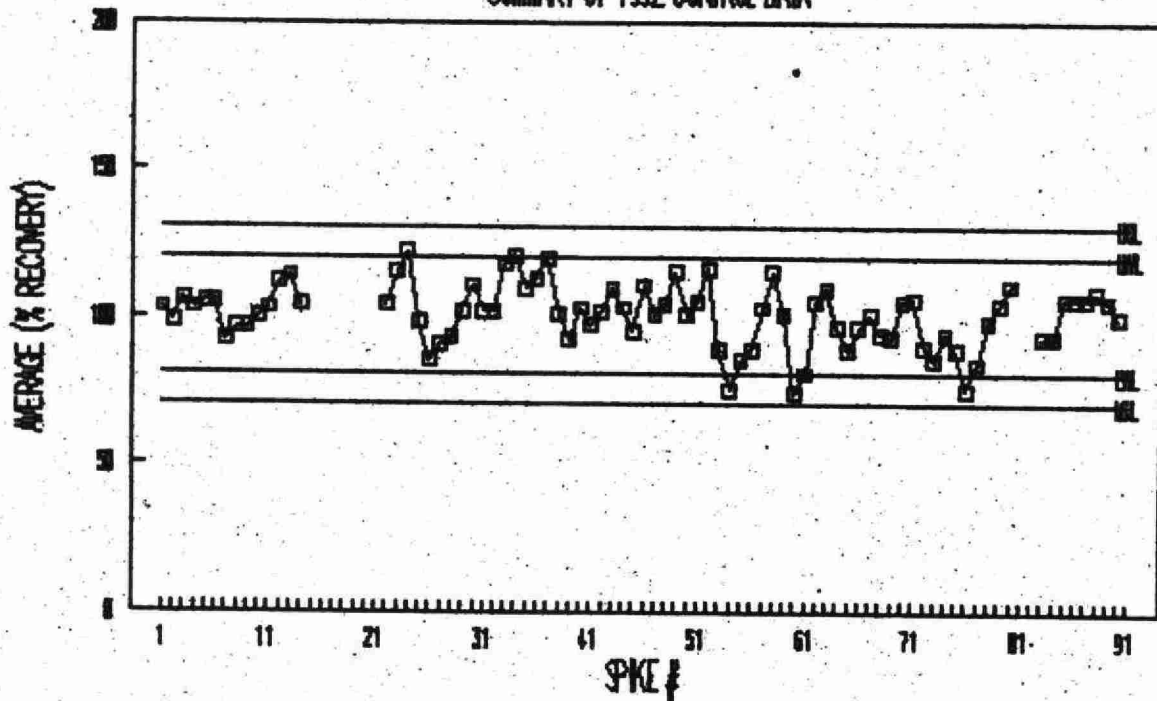
PSAOC: 236TCB

SUMMARY OF 1992 CONTROL DATA



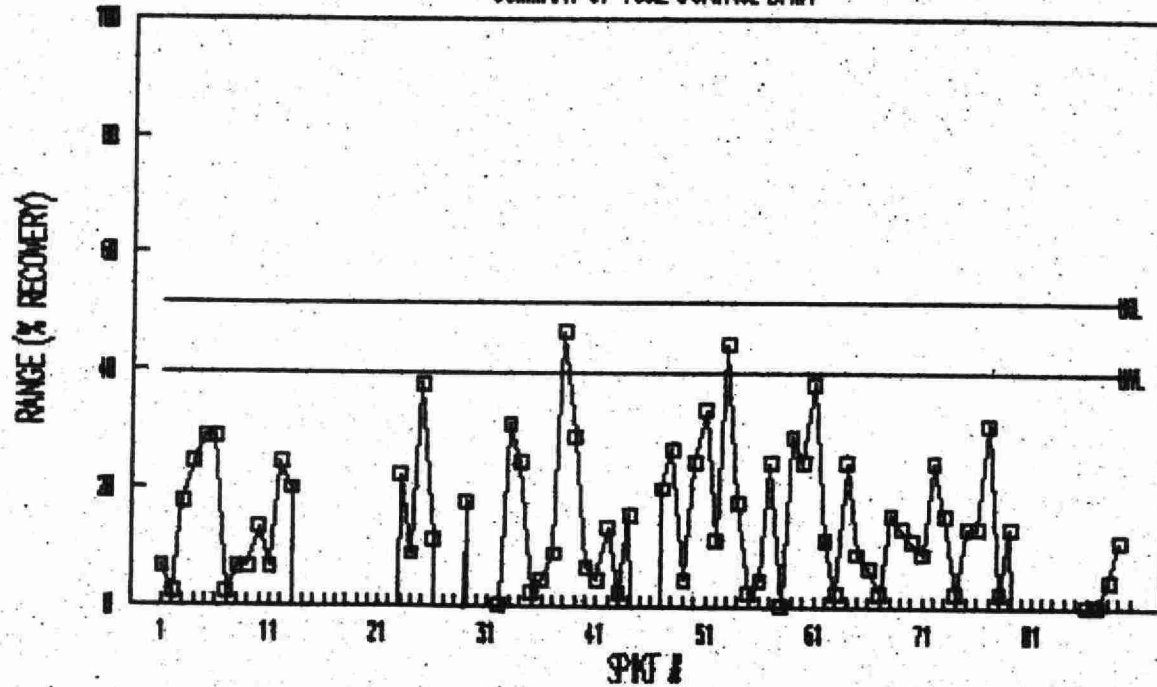
PSAOC: 209

SUMMARY OF 1992 CONTROL DATA



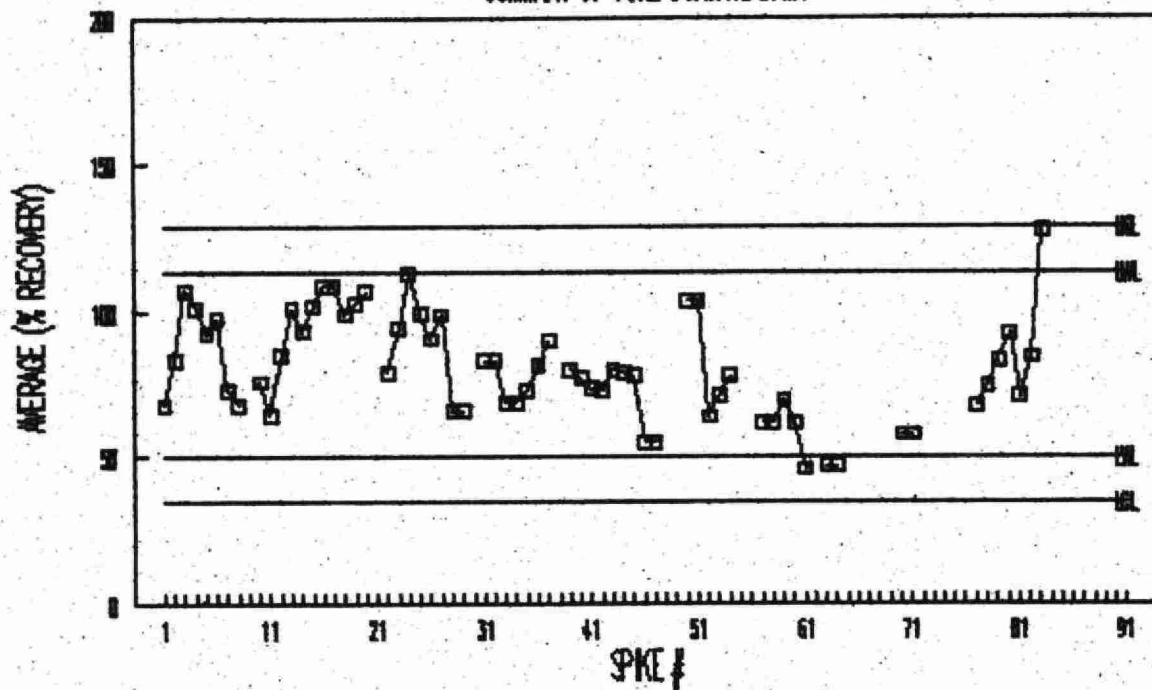
PSAOC: 209

SUMMARY OF 1992 CONTROL DATA



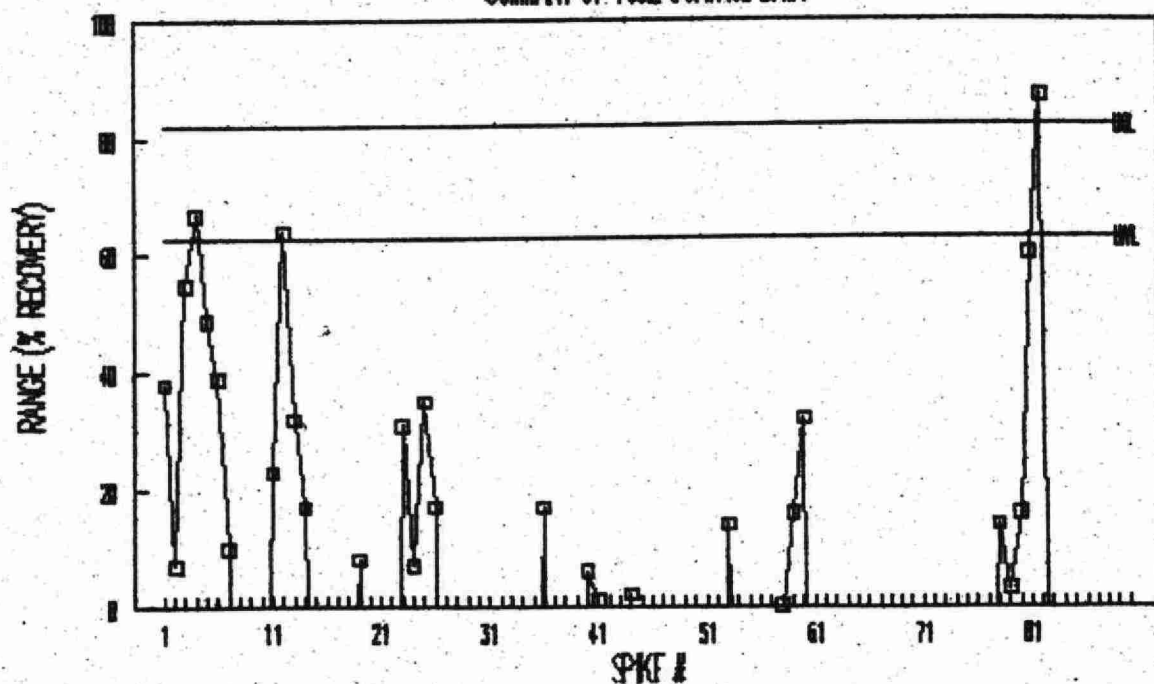
PSAOC: DBCDT

SUMMARY OF 1992 CONTROL DATA



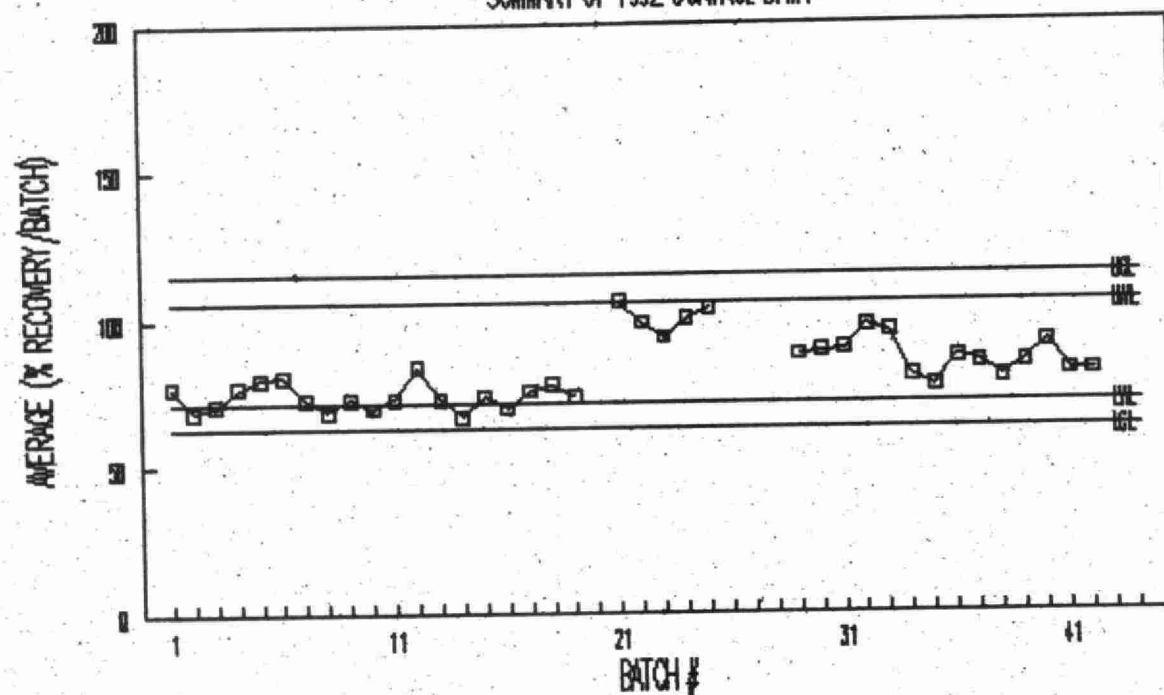
PSAOC: DBCDT

SUMMARY OF 1992 CONTROL DATA



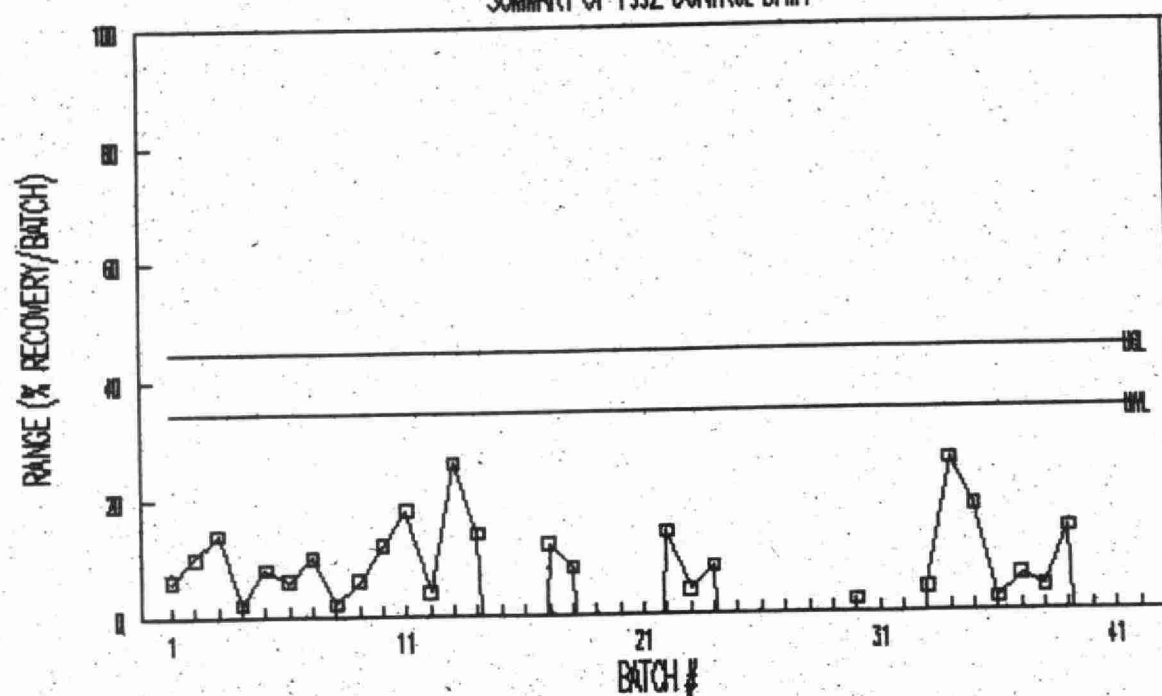
PSAOC:SURROGATE 209

SUMMARY OF 1992 CONTROL DATA



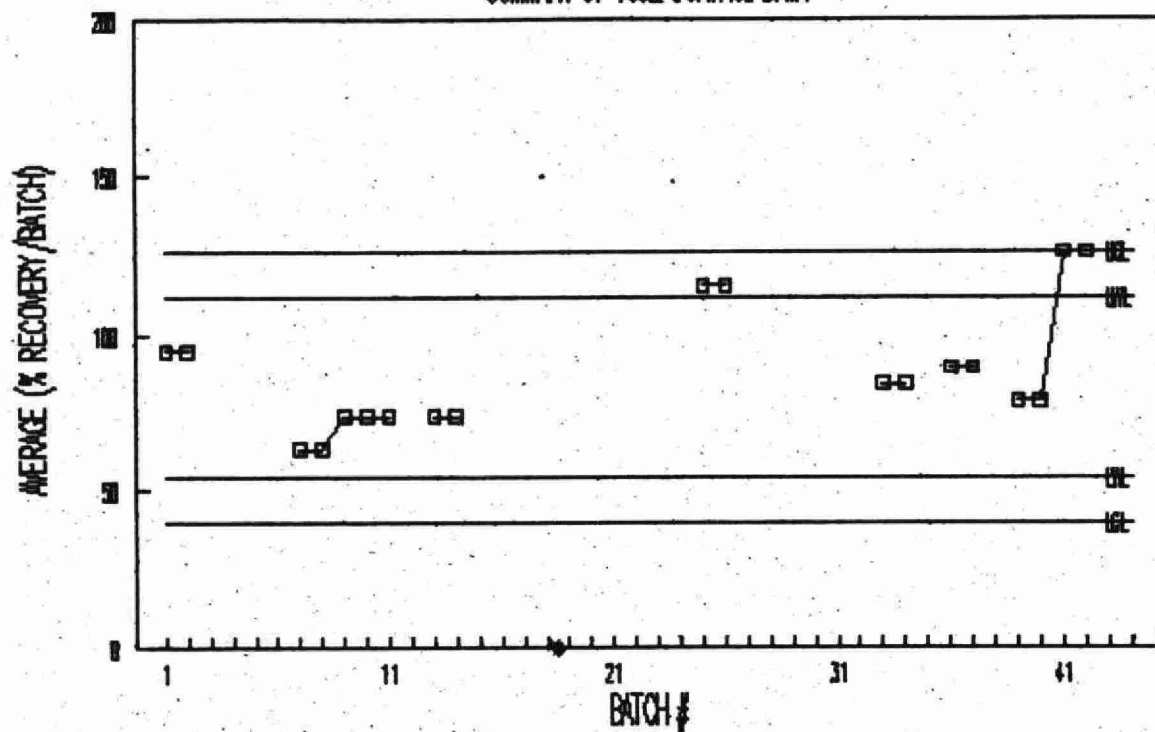
PSAOC:SURROGATE 209

SUMMARY OF 1992 CONTROL DATA



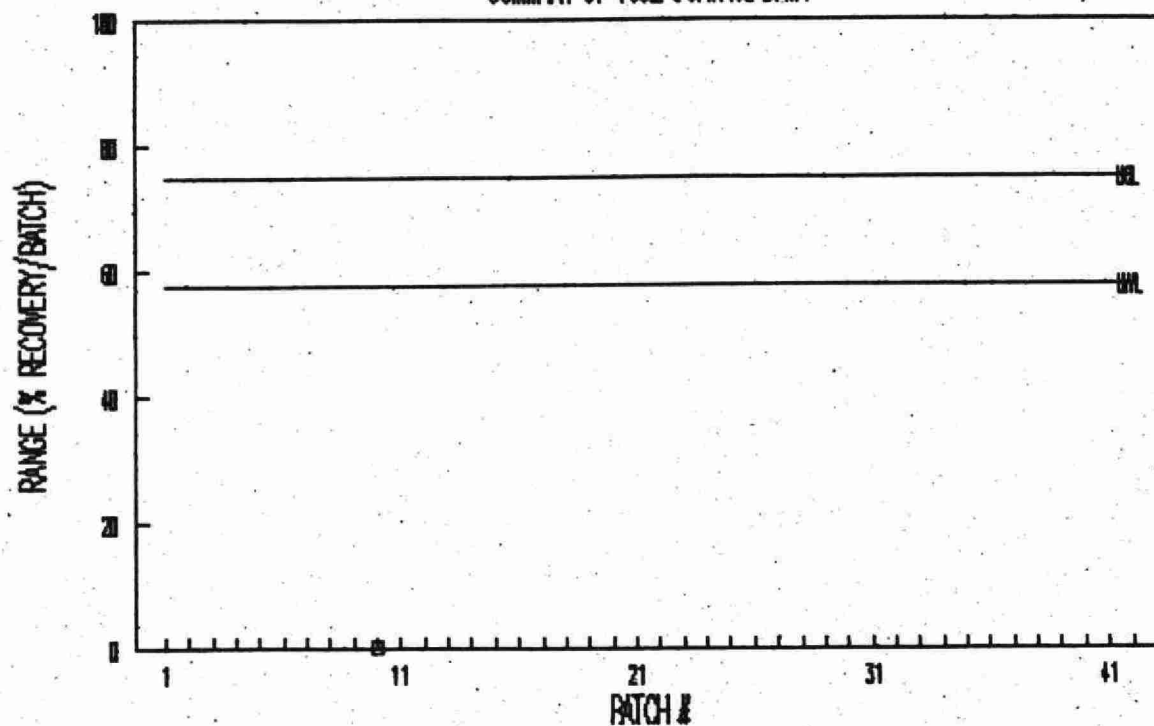
PSAOC:SURROGATE 135TBB

SUMMARY OF 1992 CONTROL DATA



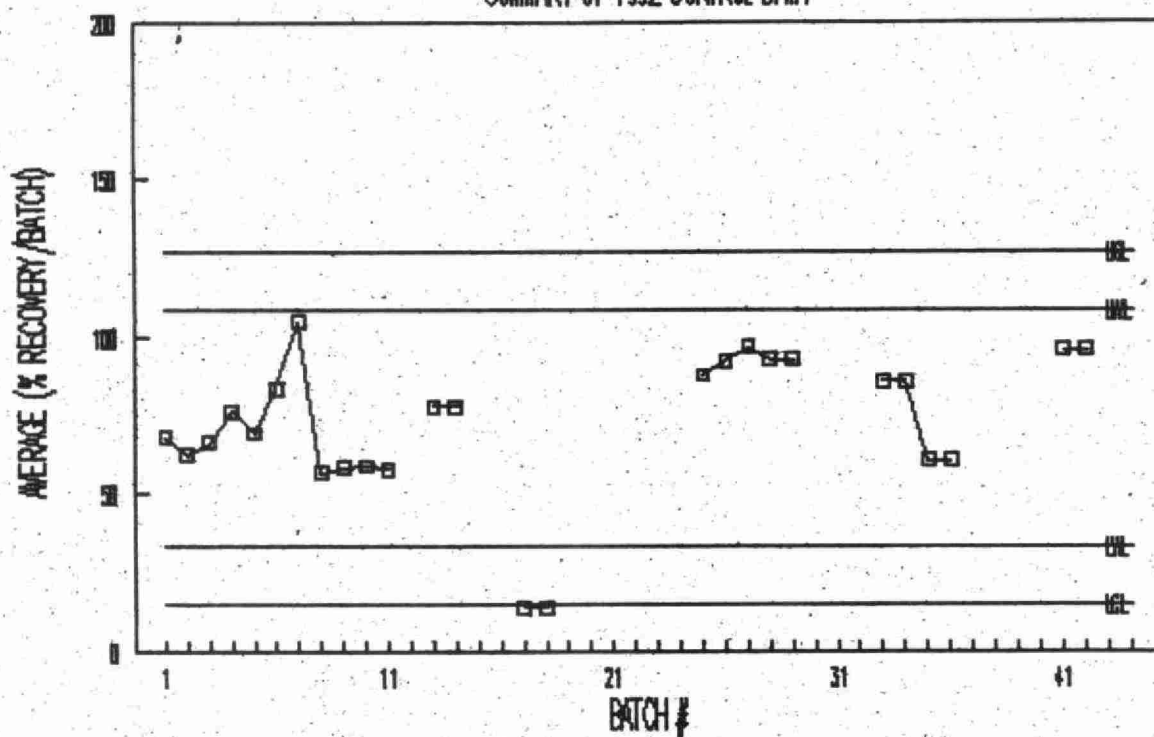
PSAOC:SURROGATE 135TBB

SUMMARY OF 1992 CONTROL DATA



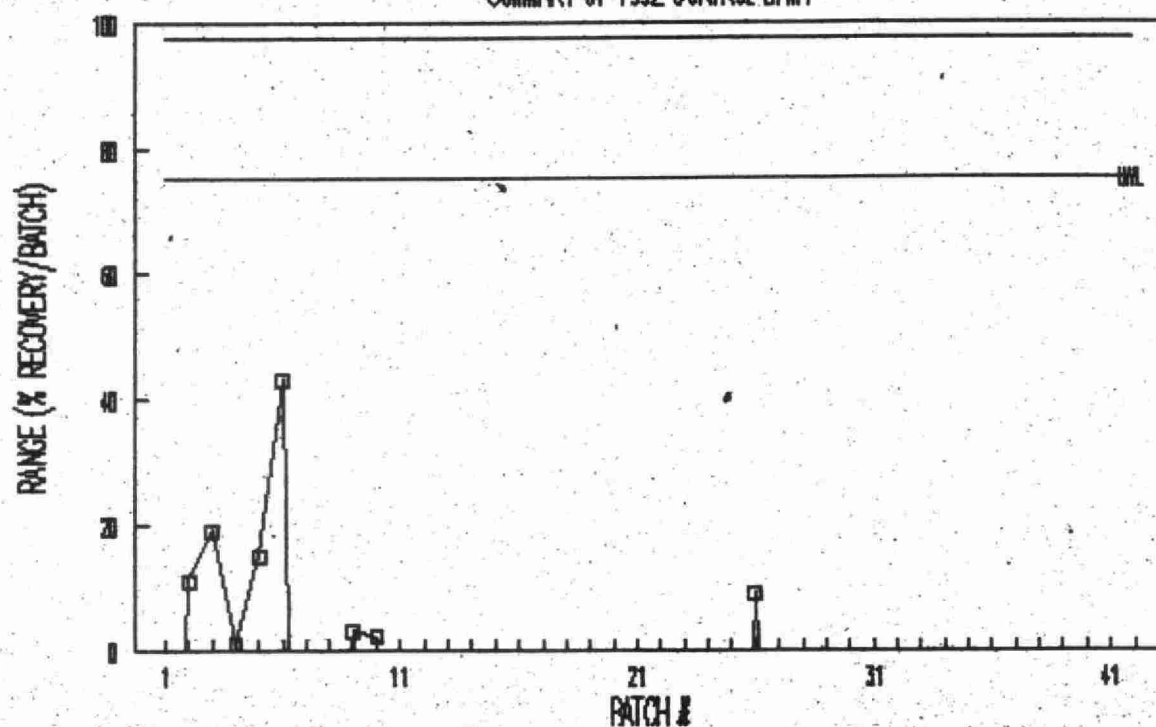
PSAOC:SURROGATE DBChD

SUMMARY OF 1992 CONTROL DATA



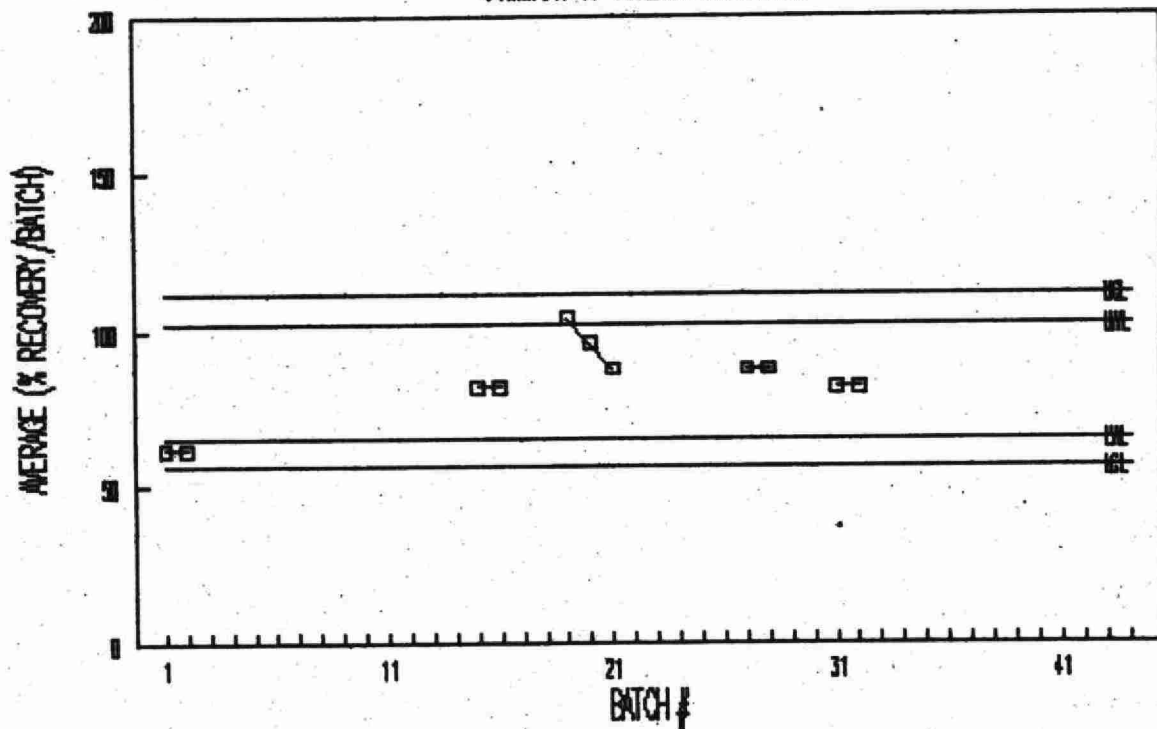
PSAOC:SURROGATE DBChD

SUMMARY OF 1992 CONTROL DATA



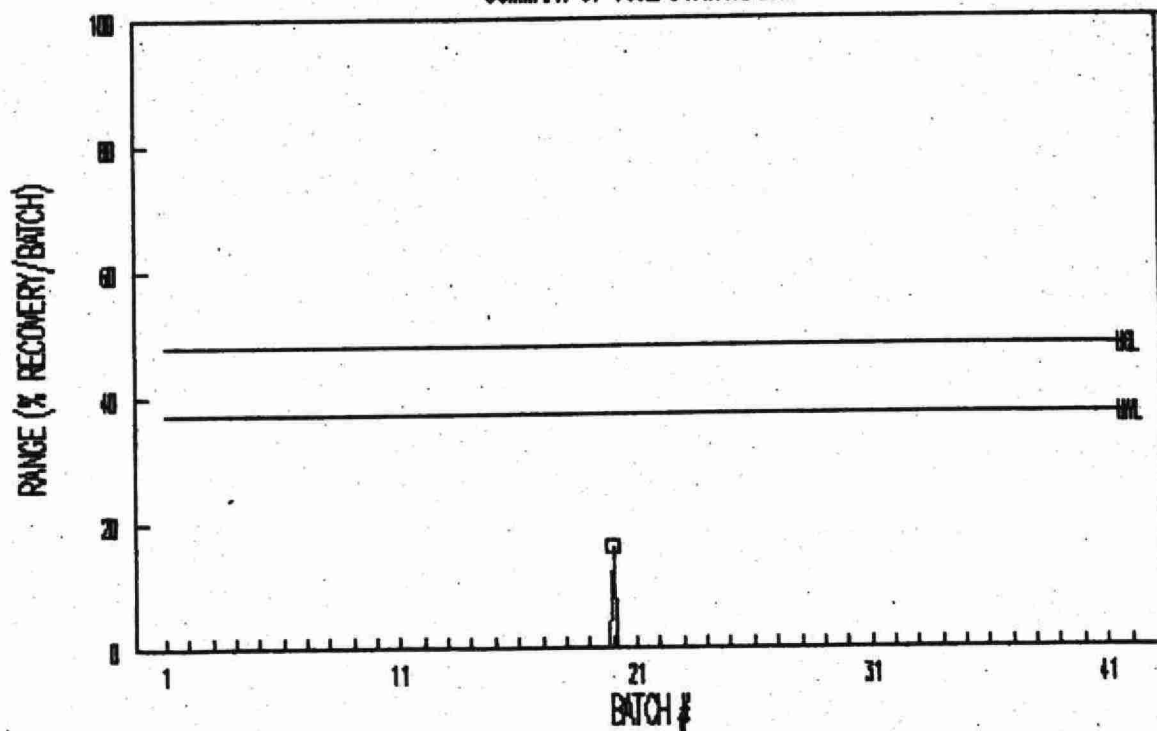
PSAOC:SURROGATE 246TBP

SUMMARY OF 1992 CONTROL DATA



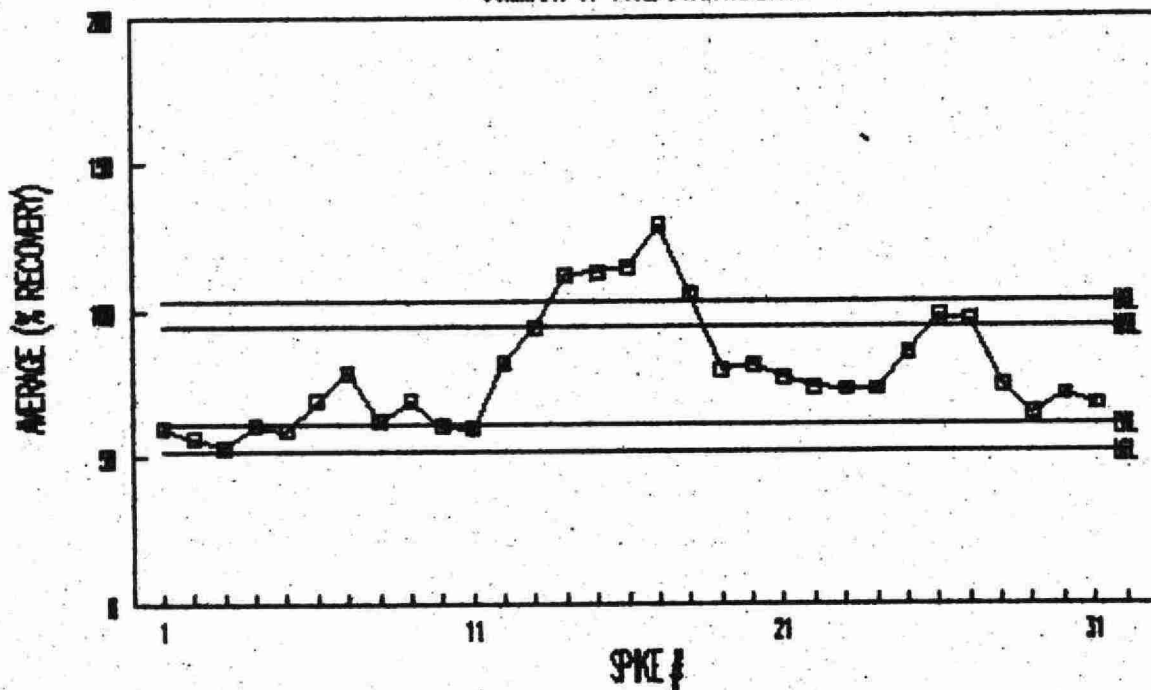
PSAOC:SURROGATE 246TBP

SUMMARY OF 1992 CONTROL DATA



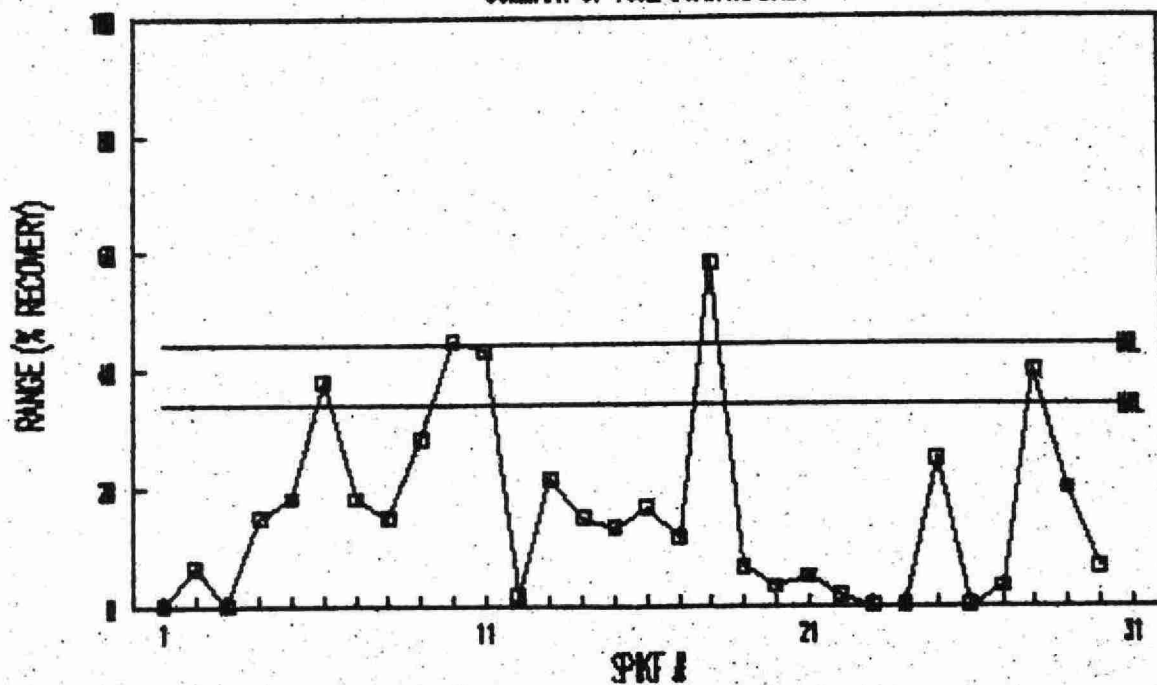
PSAPA: 234TCP

SUMMARY OF 1992 CONTROL DATA



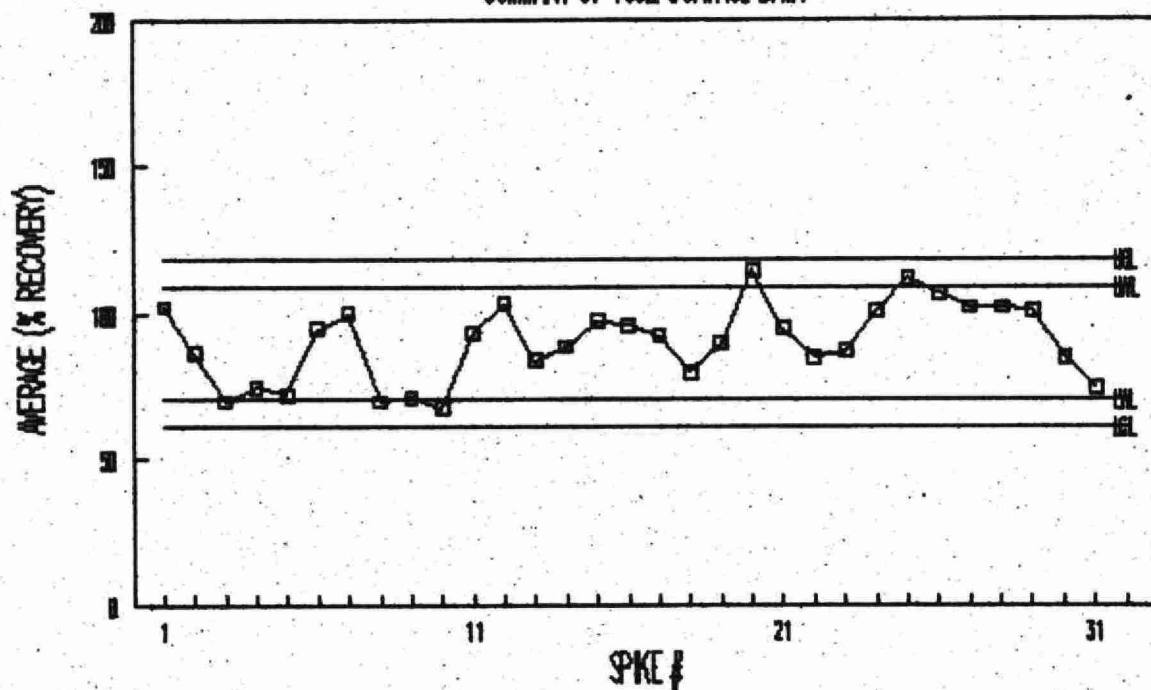
PSAPA: 234TCP

SUMMARY OF 1992 CONTROL DATA



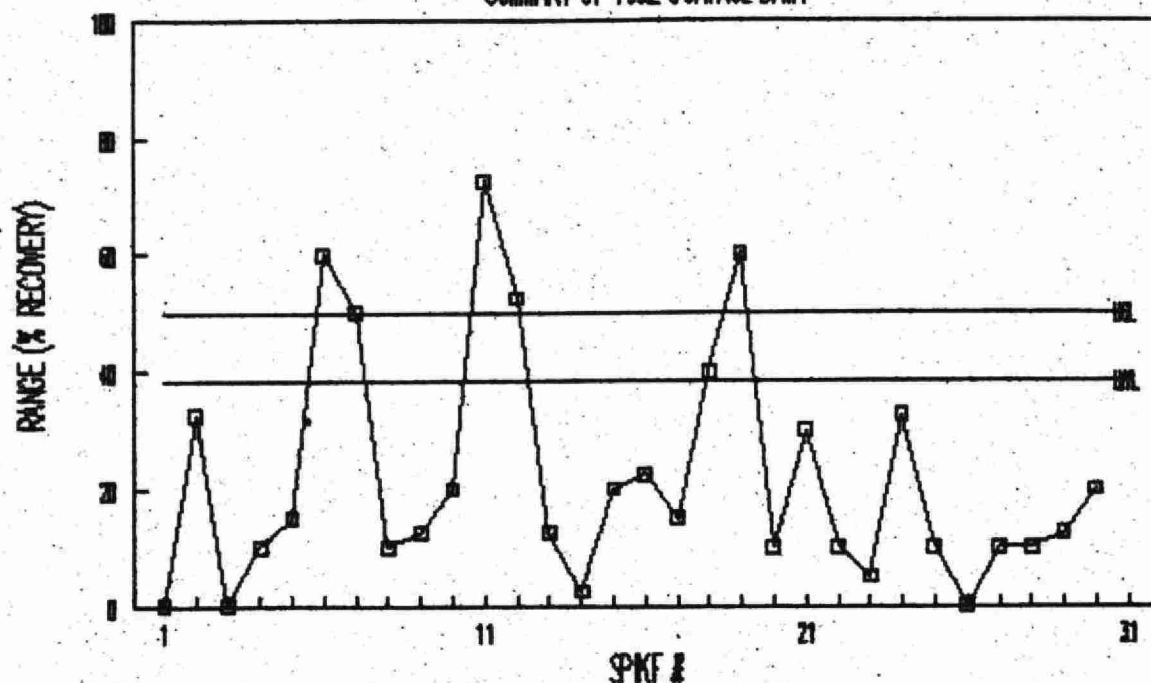
PSAPA: 2345CP

SUMMARY OF 1992 CONTROL DATA



PSAPA: 2345CP

SUMMARY OF 1992 CONTROL DATA



ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: PFAOC-E3136A

SAMPLE TYPE: FISH

UNIT: BIOTA & SEDIMENTS

SUPERVISOR: D. TONER

PRINCIPLE OF METHOD

Most fish samples arrive for analysis as frozen foil-wrapped fillets. Whole fish are treated individually. After measuring for size (length) and weight, the fish is cut in a prescribed manner to obtain a portion of the epaxial musculature which is mechanically homogenized, wrapped in aluminum foil, adequately labelled and stored in a freezer at -20 C, until analyzed. For prolonged periods of storage (over several months) the temperature should be in the -40 to -80 C range.

In the case of small fish, such as minnows, the whole fish is homogenized. Smelt are headed, tailed, gutted and then homogenized. Clams are not homogenized but are weighed as a whole.

The fish/clam sample prepared for analysis is acid digested by using concentrated hydrochloric acid, then organic solvent extracted using a mixture of 25% dichloromethane in n-hexane. The extract is neutralized with sodium bicarbonate, dried on anhydrous sodium sulphate, briefly stored until the Clean-Up Procedure can be started to remove those compounds which interfere with the gas chromatographic analysis.

The routine analysis for these compounds involves the use of a gas-liquid chromatograph equipped with electron capture detectors. This instrumental technique is very sensitive to the organochlorine compounds under test allowing for identification and quantitation at the low (1-20) ppb, or ng/g level. However, within this group of compounds it is also very non-specific and will affect to any compound able to absorb electrons.

Raw extracts obtained from fish and clam samples may contain a lot of co-extraction materials, including lipids, fats, oils, colouring pigments (carotenes) and a wide range of trace organics not necessarily of interest in this particular analysis. In order to eliminate as many of the non-target compounds as possible, and still quantitatively analyze those under test, all sample extracts (or a suitable portion) are passed through a selective adsorbent Florisil.

Florisil, (100-200 mesh), is a fine powdered form of magnesium silicate and, when cleaned and temperature-activated, will selectively adsorb organic compounds based on polarity. This property makes it very useful for the clean-up and separation of trace organics for analysis.

A suitable volumetric aliquot of the sample final extract is evaporated and applied to a Florisil column. The properties of the Florisil are such that, when activated, it will selectively retain very polar compounds, colours, lipids, oils and other co-extracted materials present in the sample aliquot, while allowing for selective quantitative recovery of the target compounds, using sequential solvent elutions.

The Florisil is calibrated daily to allow for changes in its activity and elution volumes required to effect the necessary clean-up and separation. It is a consumable reagent, used once and discarded.

The clean-up procedure used for fish, eliminates unwanted contaminants including lipids and the elution sequence used separates pesticides into three groups. In this procedure, PCB's are quantitatively separated (approximately 95% efficiency) from the DDT's in one step thus eliminating the need for further chromatographic techniques.

PARAMETERS MEASURED

- polychlorinated biphenyls
- hexachlorobenzene
- Heptachlor
- Aldrin
- p,p'-DDE
- Mirex
- α -hexachlorocyclohexane
- β -hexachlorocyclohexane
- γ -hexachlorocyclohexane
(commonly called LINDANE)
- α -Chlordane
- γ -Chlordane
- oxychlordane
- o,p'-DDT
- p,p'-DDD
- p,p'-DDT
- Methoxychlor
- Heptachlor epoxide
- Endosulfan 1
- Dieldrin
- Endrin
- Endosulfan 2
- Endosulfan sulphate
- Octachlorostyrene
- Toxaphene

hexachlorobutadiene
1,2,3-trichlorobenzene
1,2,3,4-tetrachlorobenzene
1,2,3,5-tetrachlorobenzene
1,2,4-trichlorobenzene
1,2,4,5-tetrachlorobenzene
1,3,5-trichlorobenzene
hexachloroethane
pentachlorobenzene
2,3,6-trichlorotoluene
2,4,5-trichlorotoluene

REPORTING RESULTS:

Results are reported in ng/g.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC sample.

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Interferences include plasticizers, such as pthalates, organic contaminants that may be present in low-grade solvents and chemicals used in the analytical procedures as well as contaminants originating from the handling with bare hands of samples, their extracts, or solutions.

UNIT: BIOTA & SED.
 WORKSTATION: PFAOC
 TIME PERIOD: JAN.-DEC.1992

MATRIX: FISH
 INSTRUMENT: GC
 NO. OBSERVATIONS: 48

YEARLY CALCULATION

PARAMETER COMPOUND	SPIKE NG/G	AVG. SPK. % REC.	STD. DEV. %REC.	% C.V.
1. PCB	: 1000	: 93	: 15	: 16
2. HCB	: 10	: 71	: 17	: 24
3. HEPT	: 40	: 87	: 17	: 20
4. ALDR	: 40	: 102	: 24	: 23
5. PPDDE	: 40	: 143	: 24	: 17
6. MIREX	: 100	: 128	: 21	: 16
7. BHCA	: 40	: 92	: 26	: 28
8. BHCG	: 40	: 93	: 20	: 22
9. BHCB	: 40	: 92	: 18	: 19
10. CHLA	: 40	: 96	: 17	: 17
11. CHIG	: 40	: 99	: 17	: 17
12. OPDDT	: 100	: 83	: 35	: 42
13. PPDDD	: 100	: 85	: 19	: 23
14. PPDDT	: 100	: 83	: 18	: 22
15. OCSTYR	: 20	: 88	: 14	: 16
16. PCB209*	: 45	: 99	: 21	: 21
17. HCBD	: 20	: 70	: 18	: 25
18. 123TCB	: 20	: 83	: 9	: 10
19. 1234TCB	: 20	: 84	: 11	: 13
20. 1235TCB	: 20	: 80	: 9	: 12

UNIT: BIOTA & SED.
 WORKSTATION: PFAOC
 TIME PERIOD: JAN.-DEC.1992

MATRIX: FISH
 INSTRUMENT: GC
 NO. OBSERVATIONS: 48

YEARLY CALCULATION

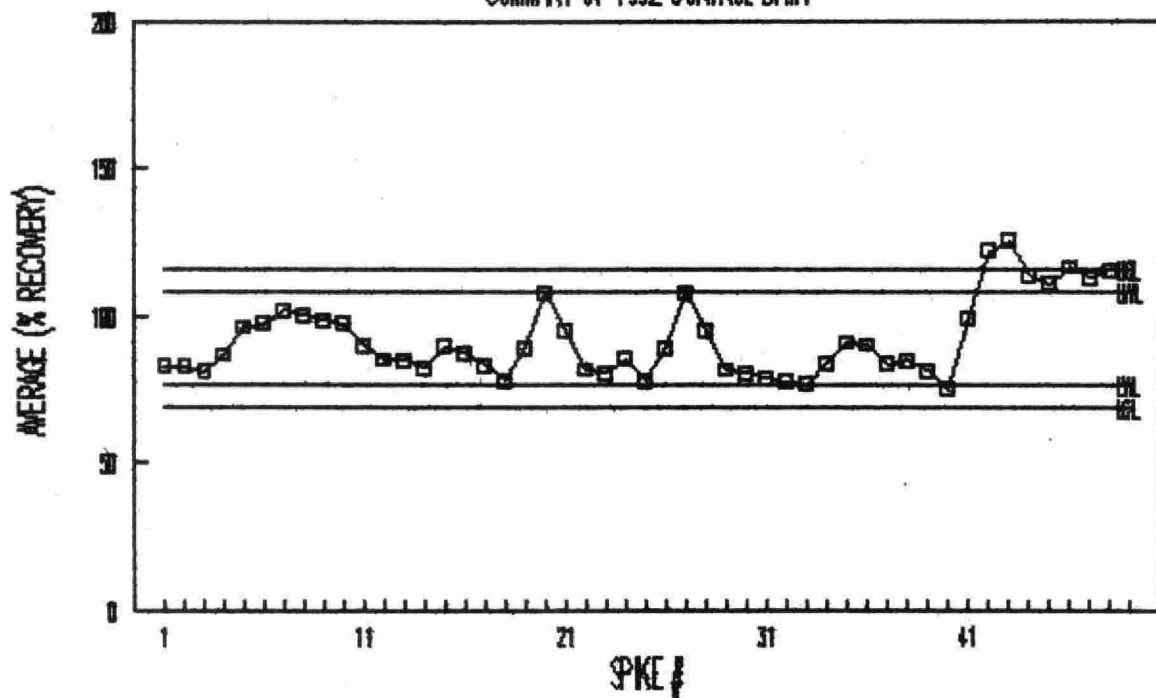
PARAMETER COMPOUND	SPIKE NG/G	AVG. SPK. % REC.	STD. DEV. %REC.	% C.V.
21. 124TCB	: 10	: 115	: 25	: 22
22. 1245TCB	: 20	: 83	: 13	: 16
23. 135TCB	: 20	: 76	: 11	: 14
24. HCE	: 20	: 64	: 8	: 13
25. PNCB	: 20	: 87	: 12	: 14
26. 236TCB	: 20	: 70	: 9	: 13
27. 245TCB	: 20	: 79	: 8	: 10
28. A26TCT	: 20	: 54	: 12	: 21
29. 135TBB*	: 20	: 95	: 8	: 8

SURROGATE IN FISH SAMPLE

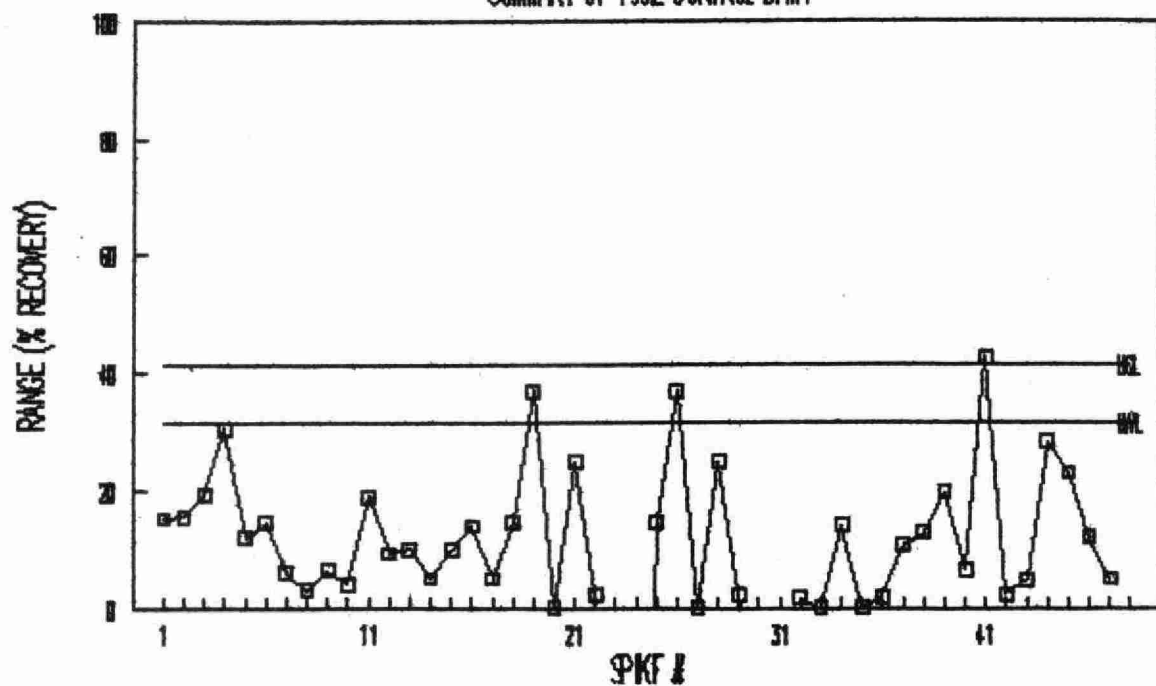
NO. OBSERVATIONS 36

1. PCB209*	: 14.74	: 89.39	: 13.17	: 14.73
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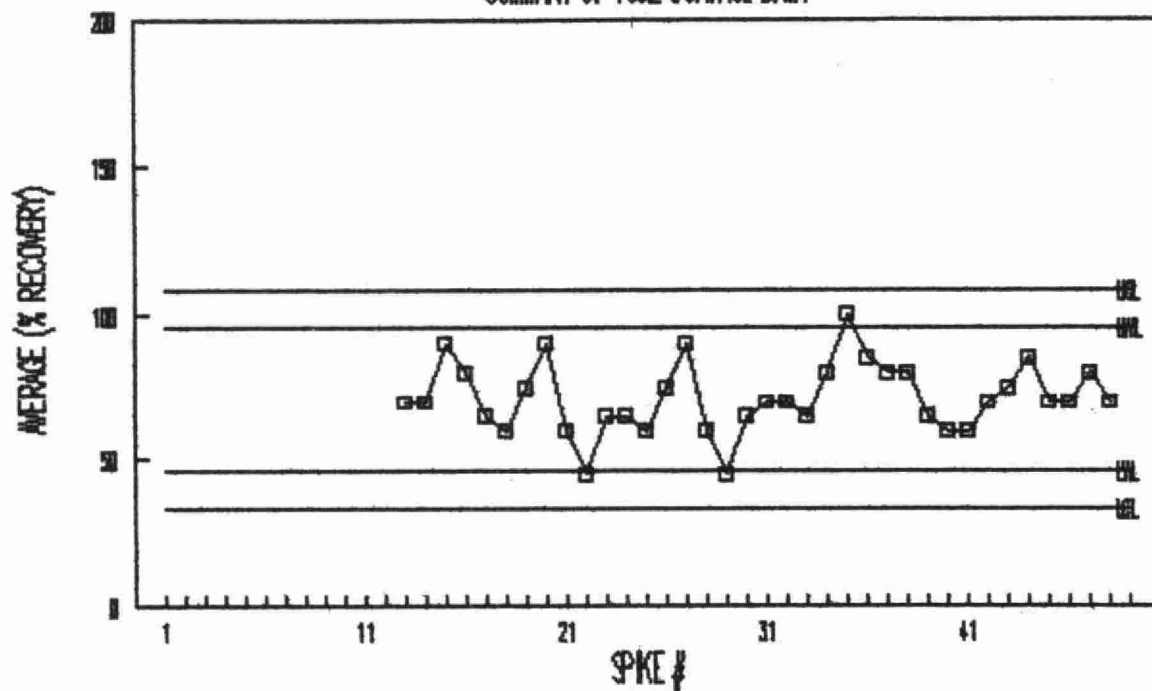
PFAOC: PCB SUMMARY OF 1992 CONTROL DATA



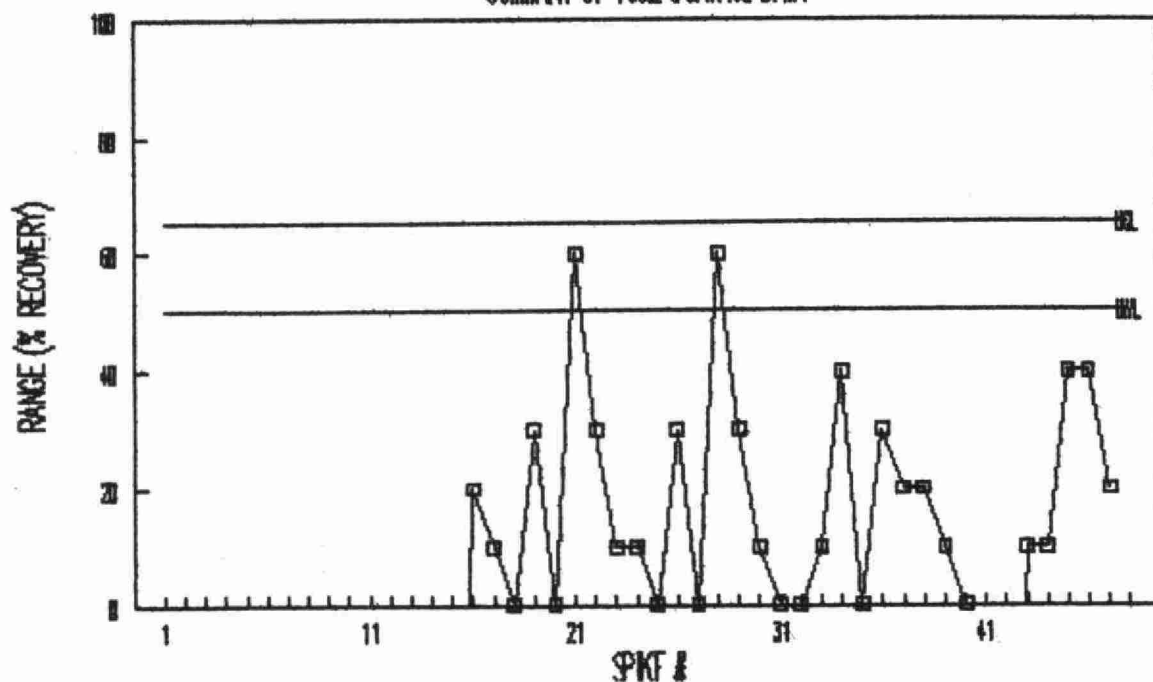
PFAOC: PCB SUMMARY OF 1992 CONTROL DATA



PFAOC: HCB SUMMARY OF 1992 CONTROL DATA

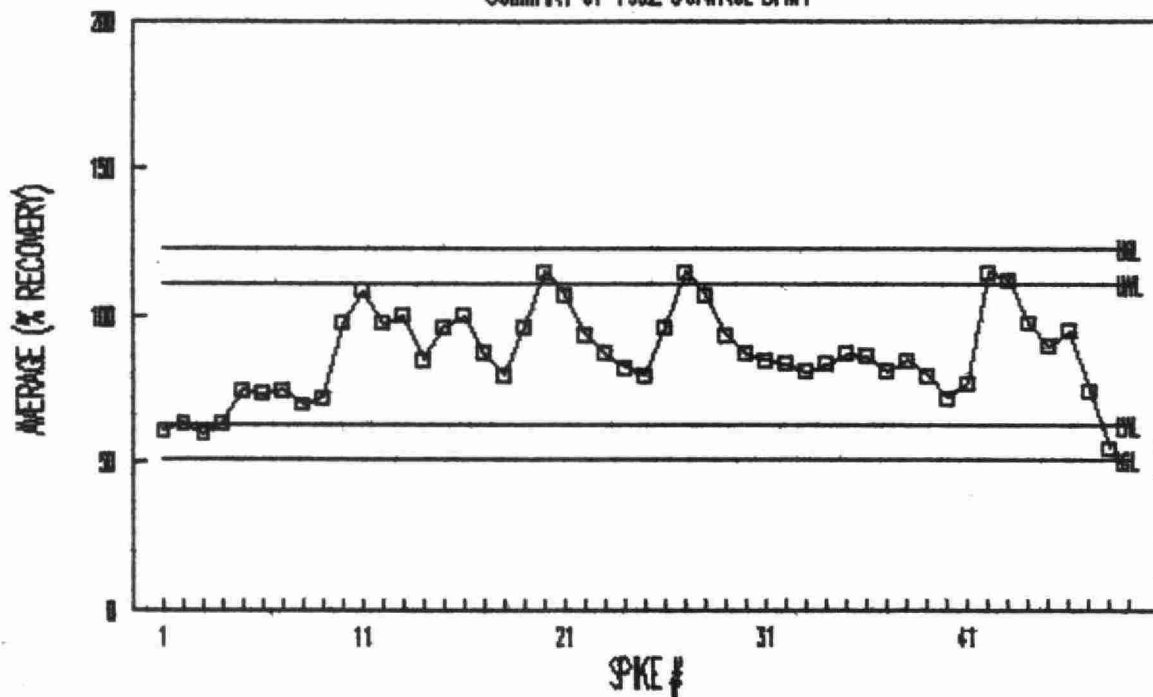


PFAOC: HCB SUMMARY OF 1992 CONTROL DATA



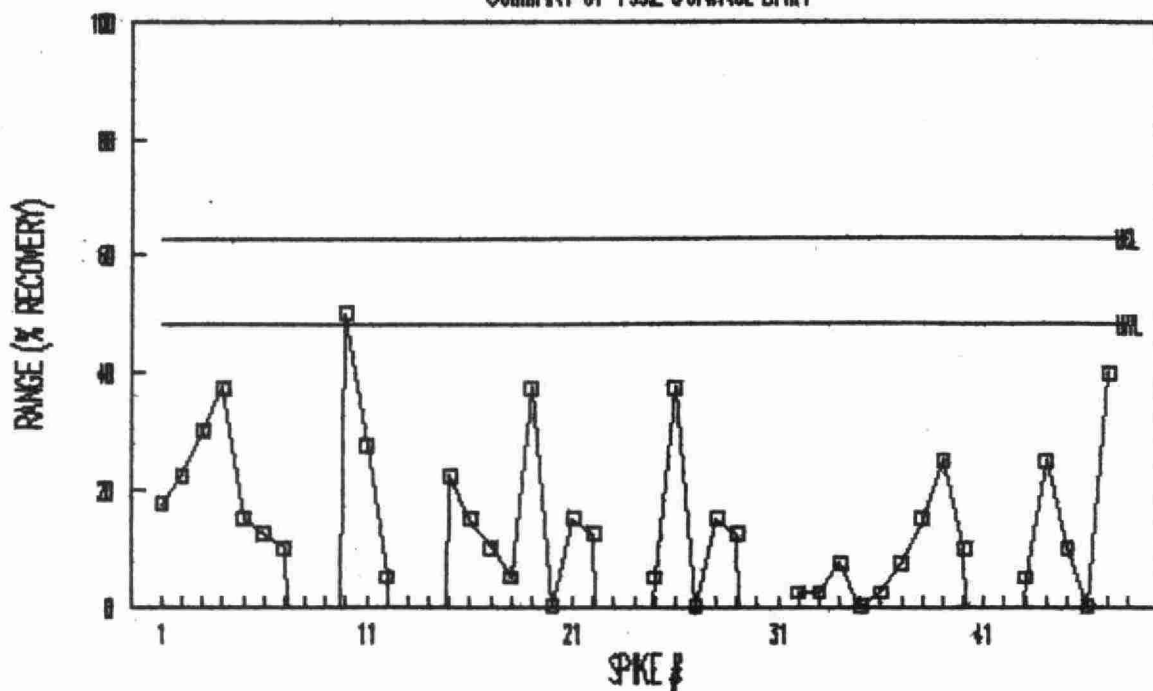
PFAOC: HEPT

SUMMARY OF 1992 CONTROL DATA



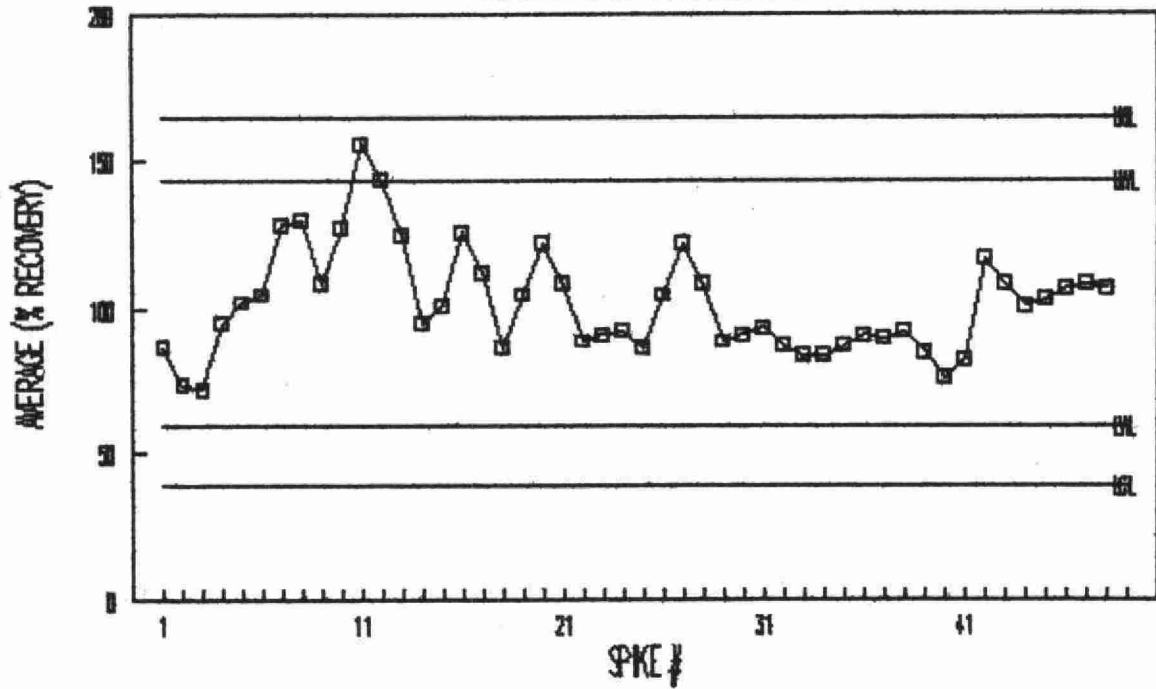
PFAOC: HEPT

SUMMARY OF 1992 CONTROL DATA



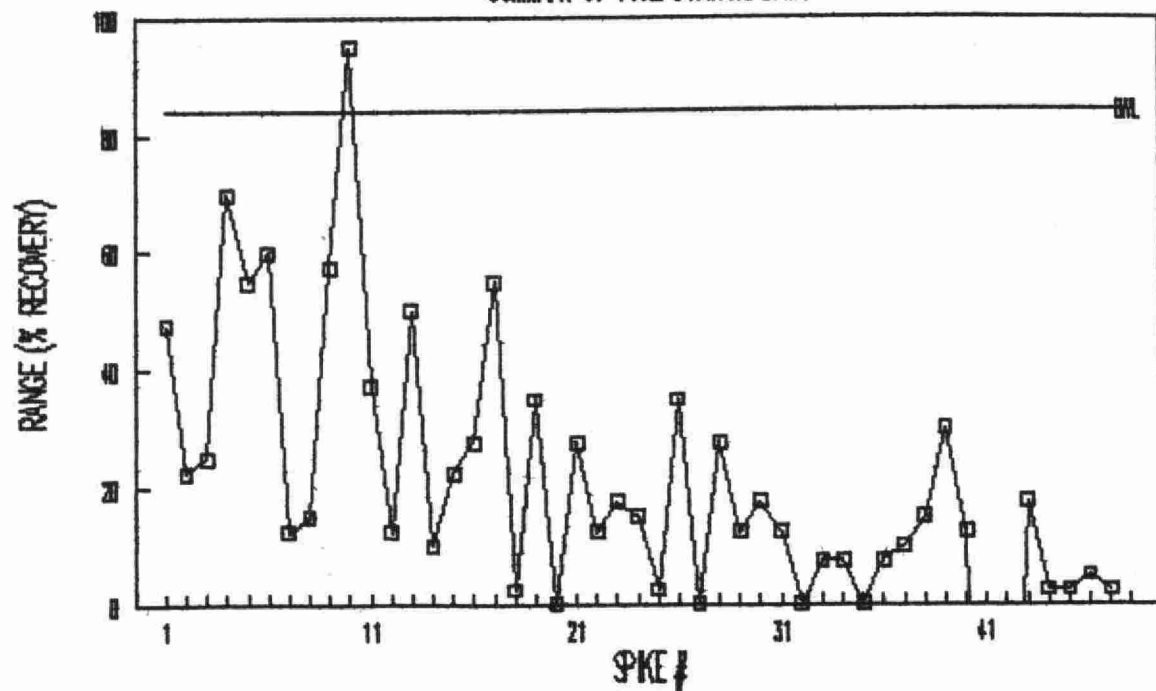
PFAOC: ALDR

SUMMARY OF 1992 CONTROL DATA



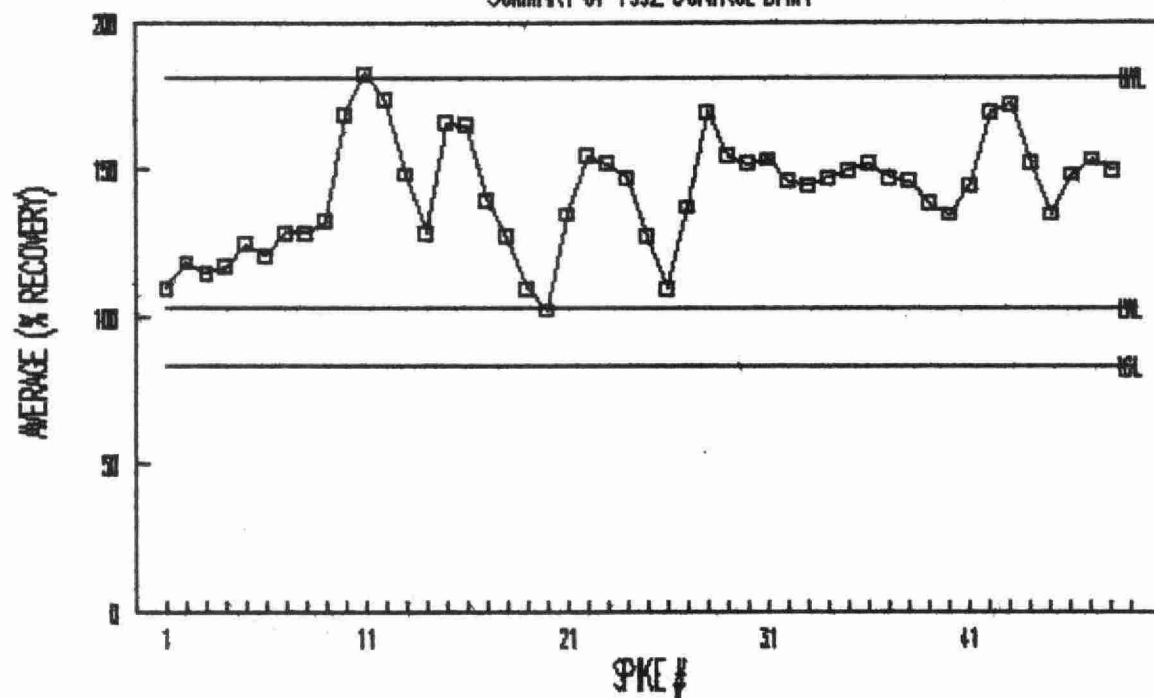
PFAOC: ALDR

SUMMARY OF 1992 CONTROL DATA



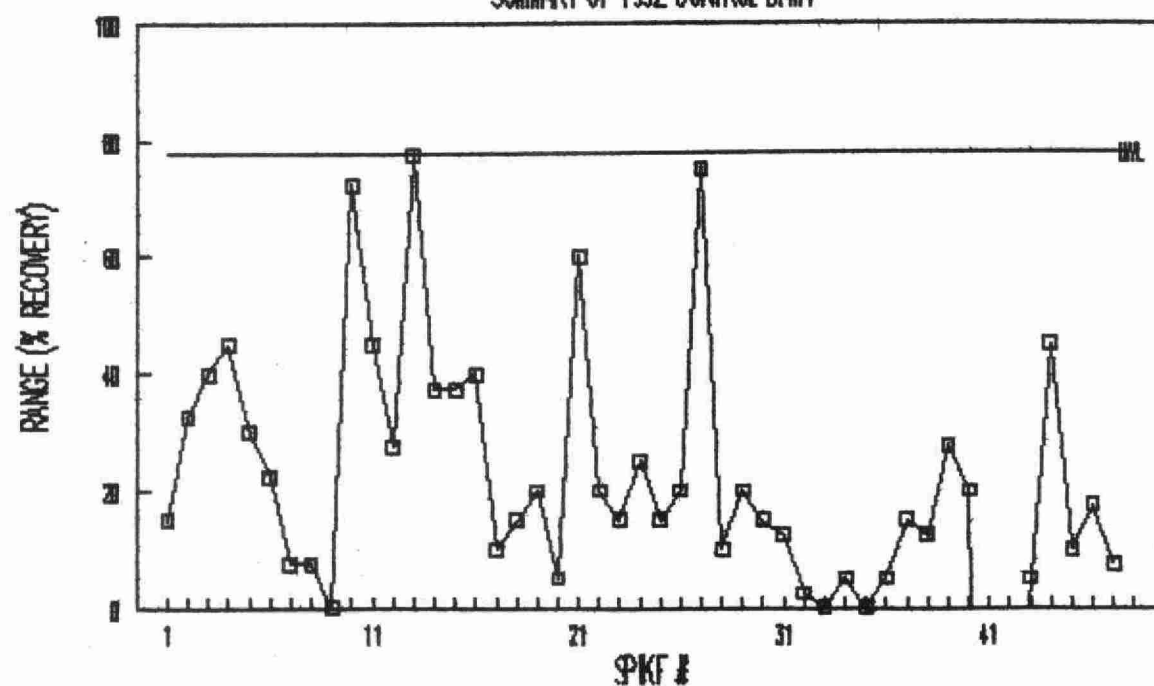
PFAOC: PPDDE

SUMMARY OF 1992 CONTROL DATA



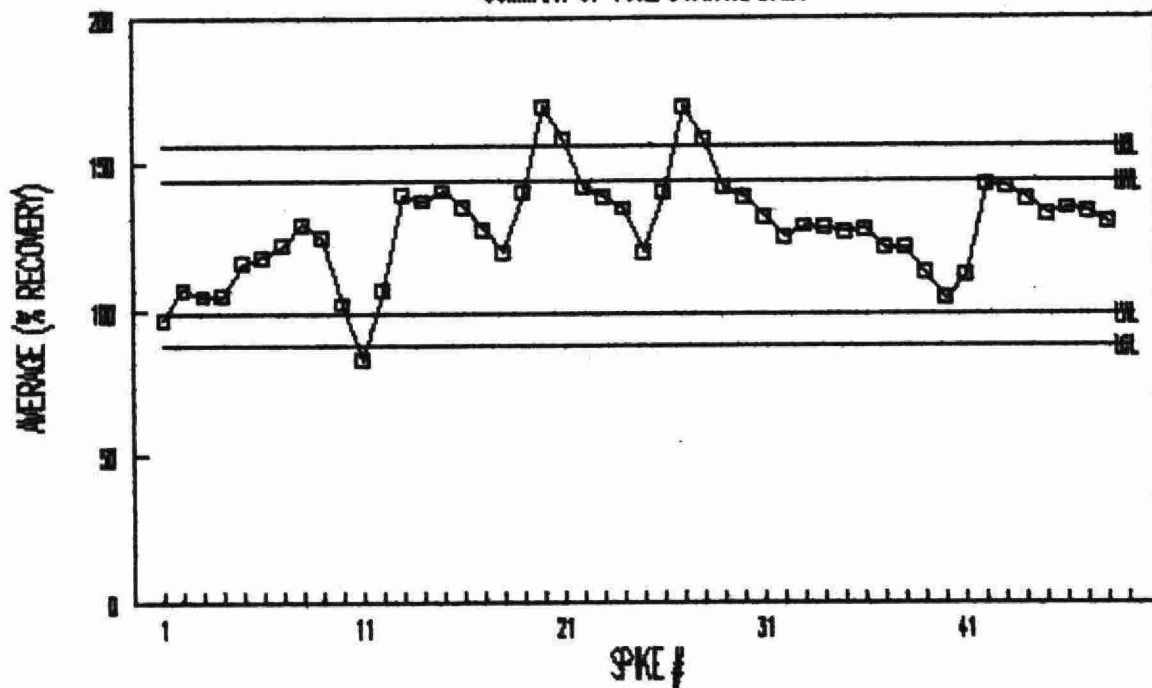
PFAOC: PPDDE

SUMMARY OF 1992 CONTROL DATA



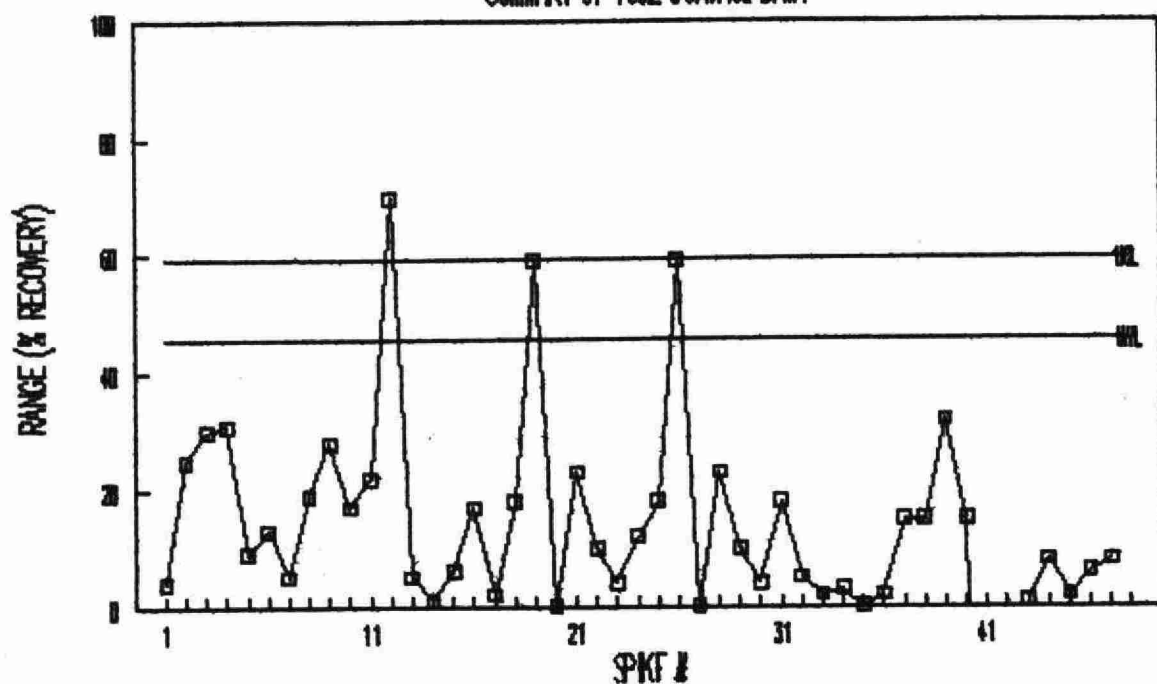
PFAOC: MIREX

SUMMARY OF 1992 CONTROL DATA

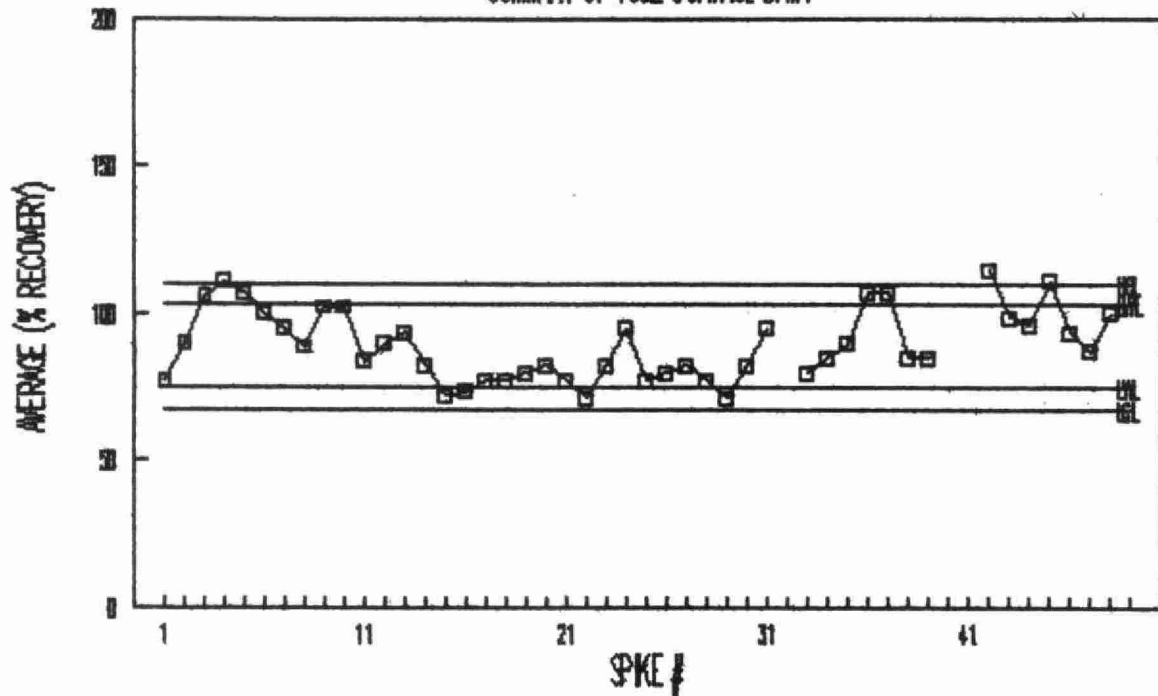


PFAOC: MIREX

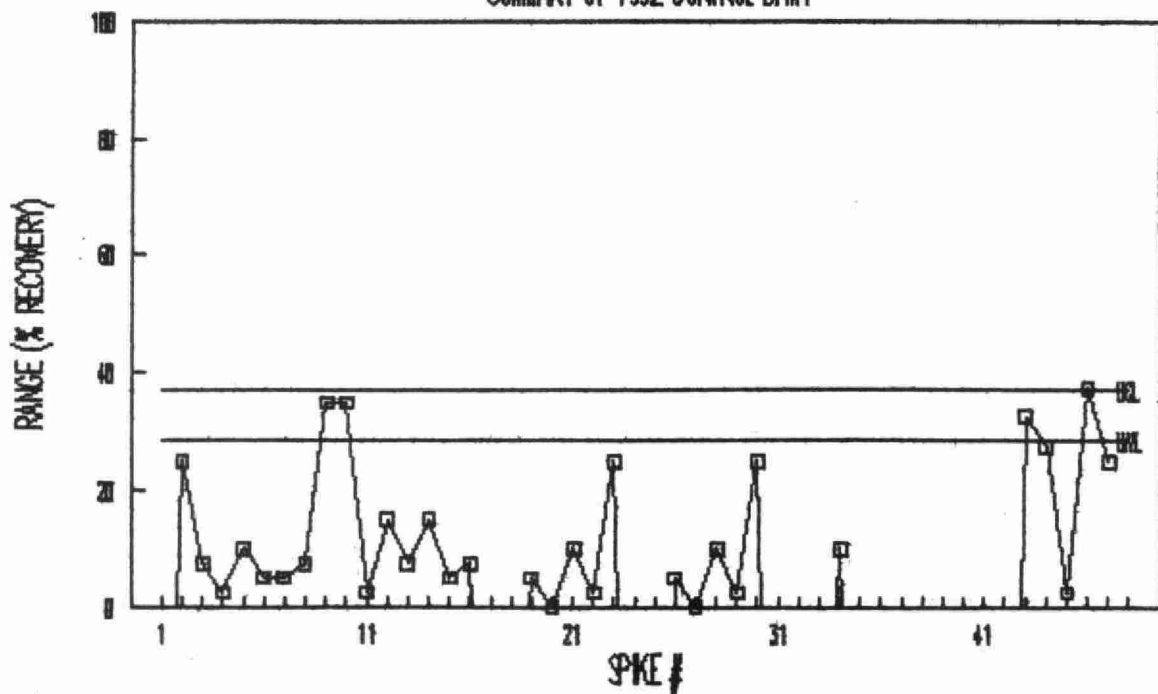
SUMMARY OF 1992 CONTROL DATA



PFAOC: BHCA SUMMARY OF 1992 CONTROL DATA

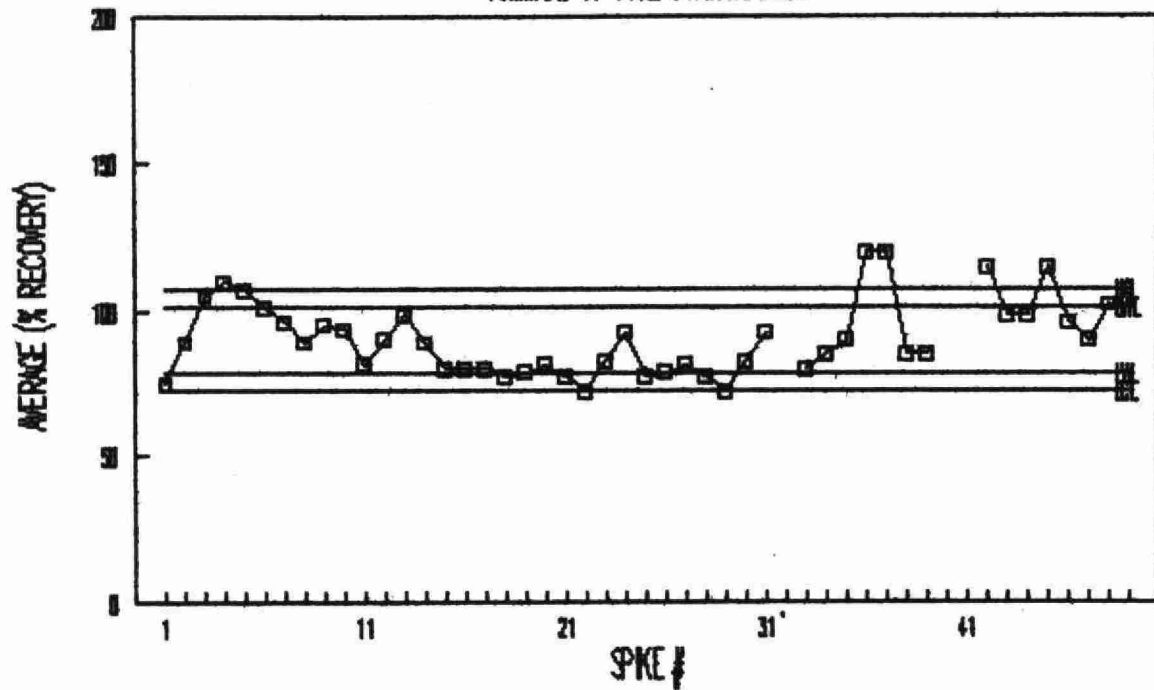


PFAOC: BHCA SUMMARY OF 1992 CONTROL DATA



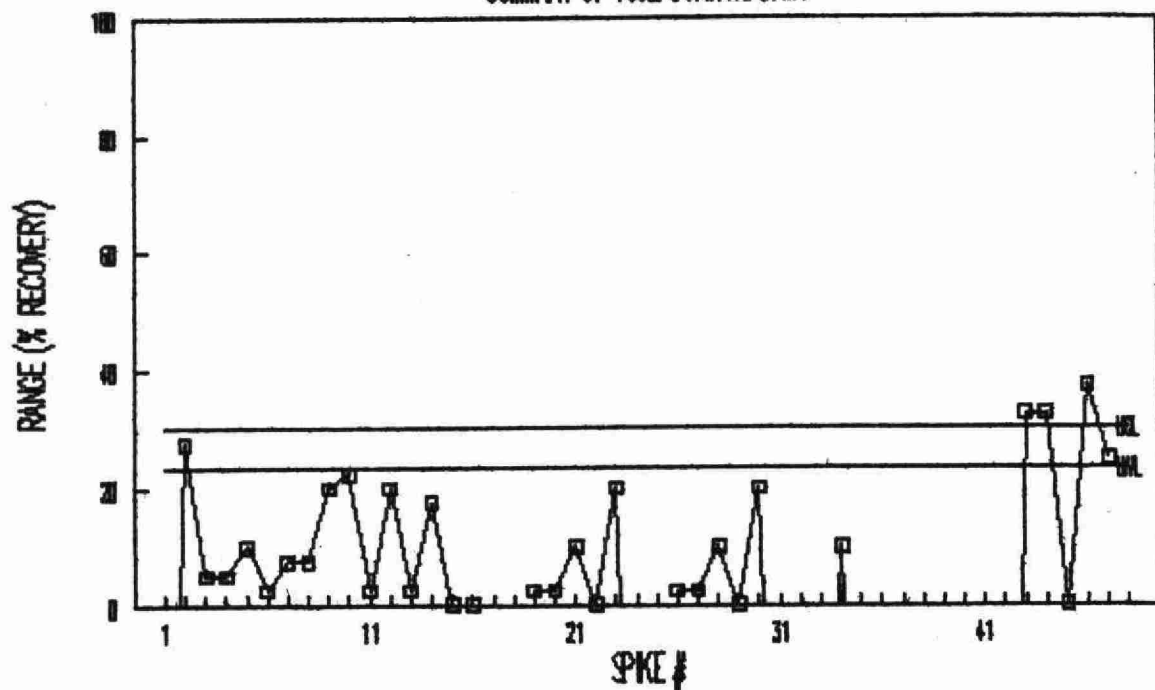
PFAOC: BHCG

SUMMARY OF 1992 CONTROL DATA



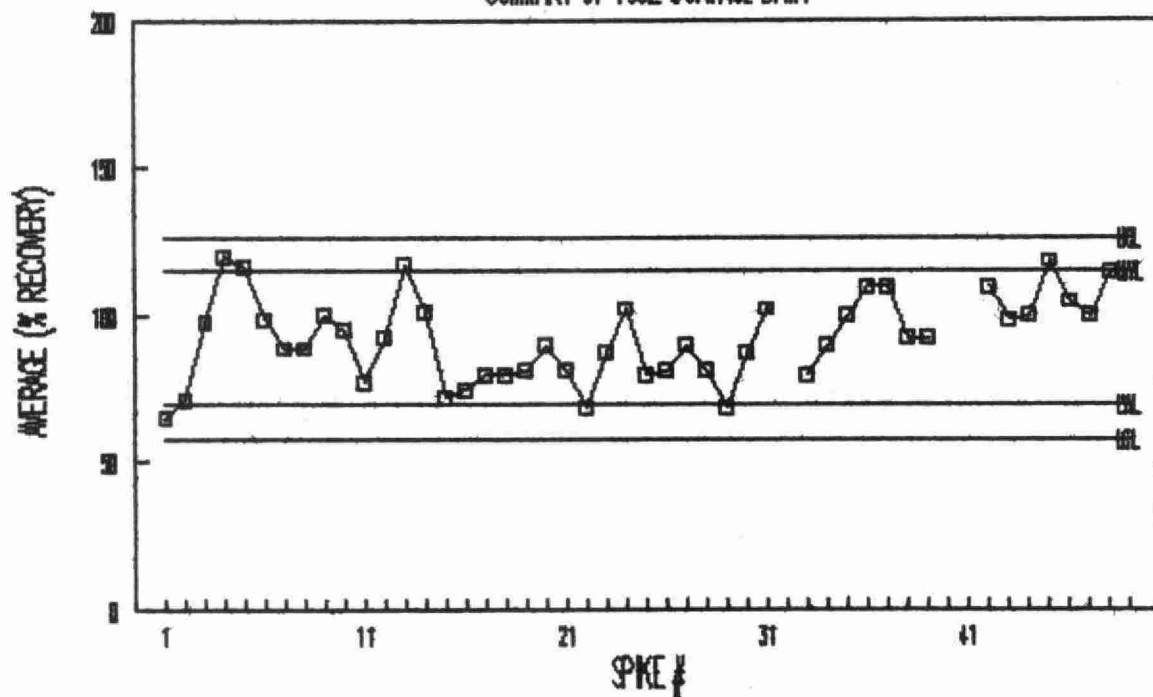
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SUMMARY OF 1992 CONTROL DATA



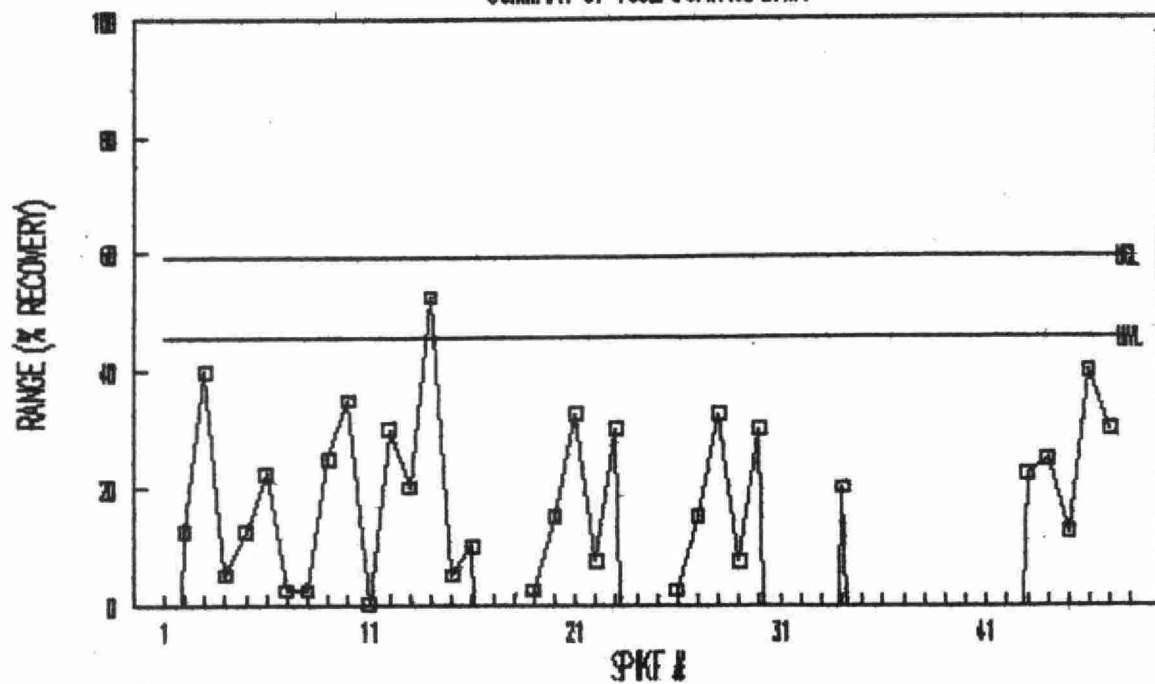
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SUMMARY OF 1992 CONTROL DATA



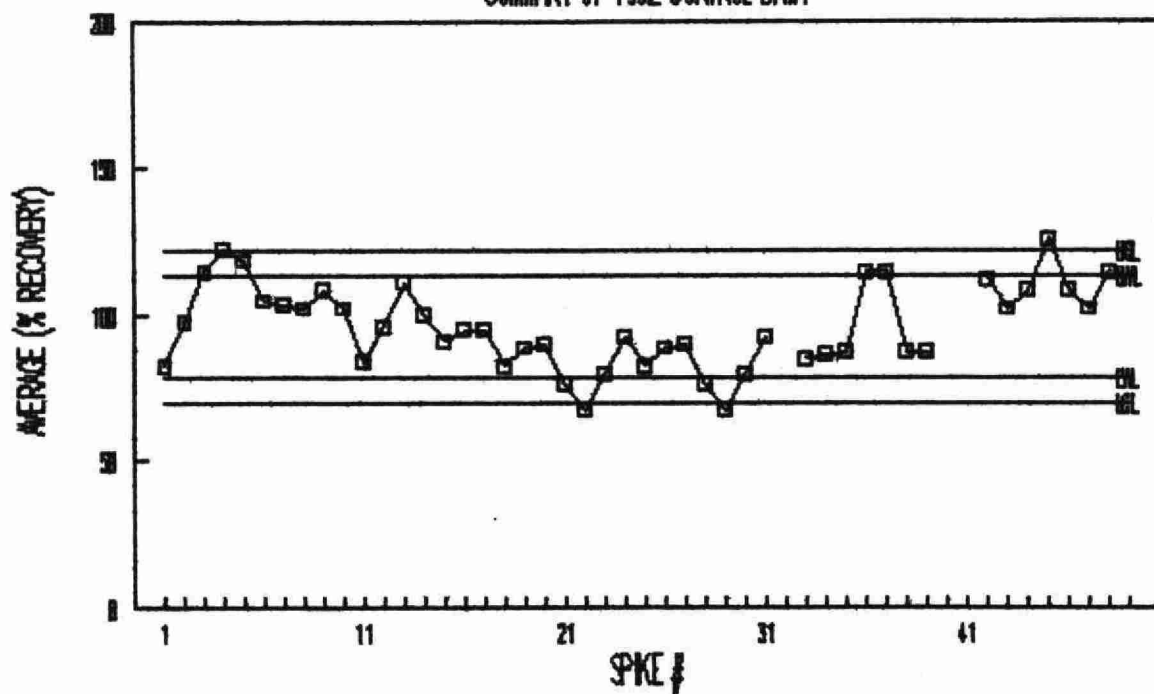
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SUMMARY OF 1992 CONTROL DATA



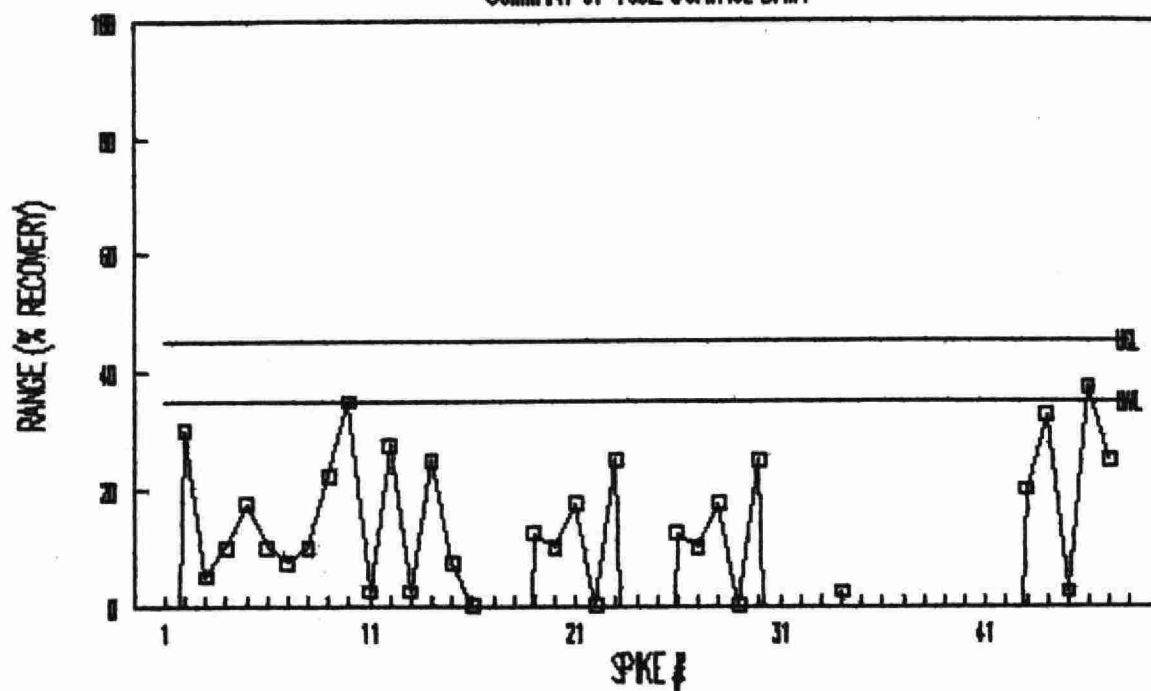
PFAOC: CHLA

SUMMARY OF 1992 CONTROL DATA



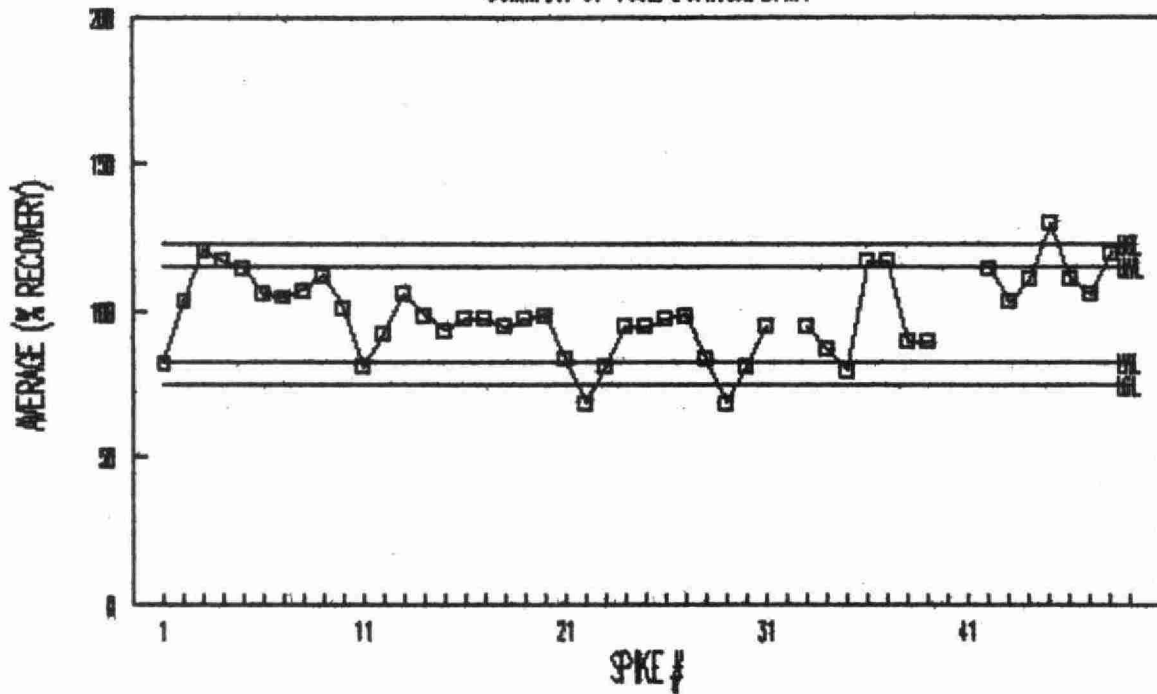
PFAOC: CHLA

SUMMARY OF 1992 CONTROL DATA



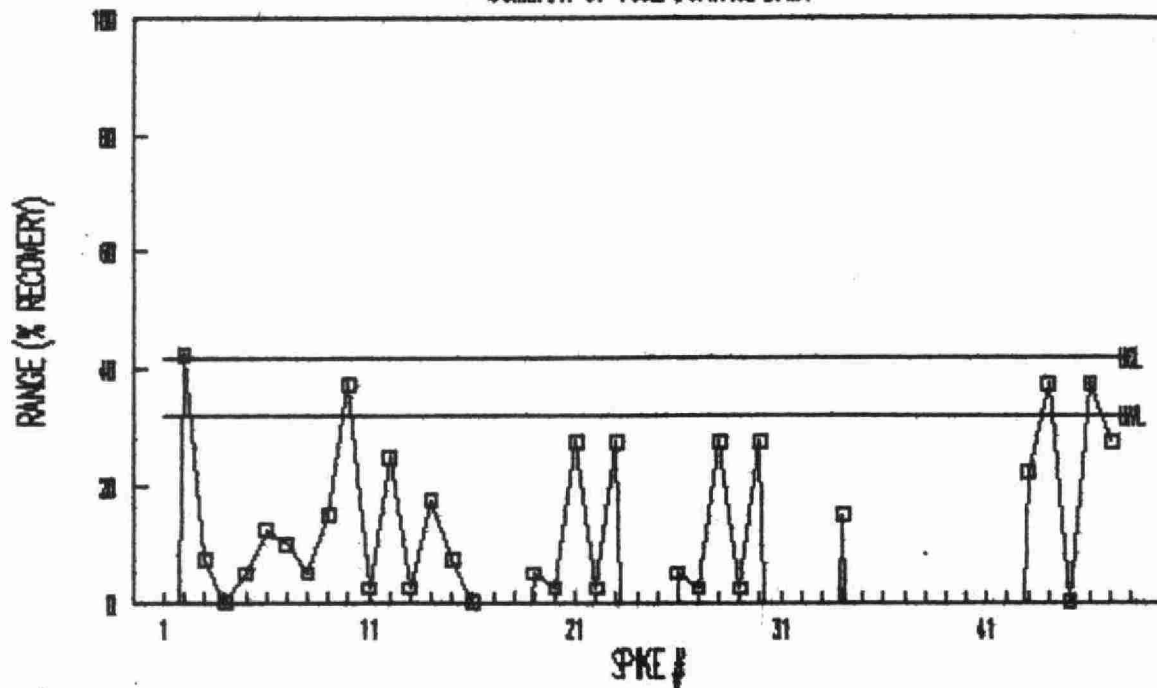
PFAOC: CHLG

SUMMARY OF 1992 CONTROL DATA



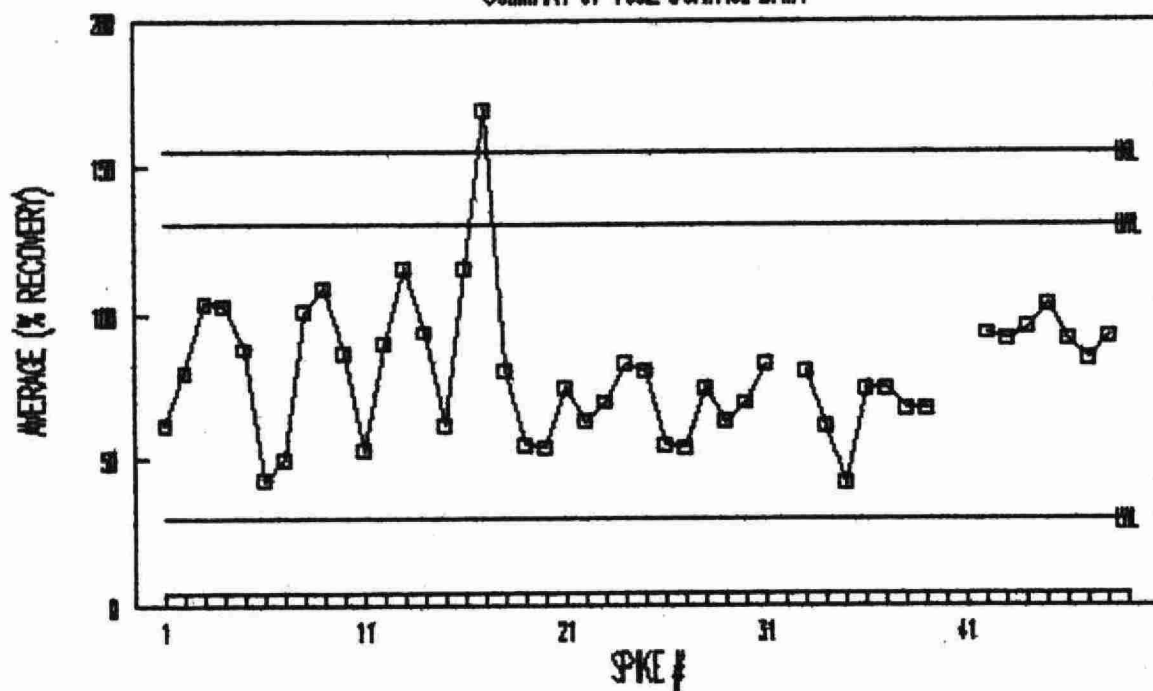
PFAOC: CHLG

SUMMARY OF 1992 CONTROL DATA



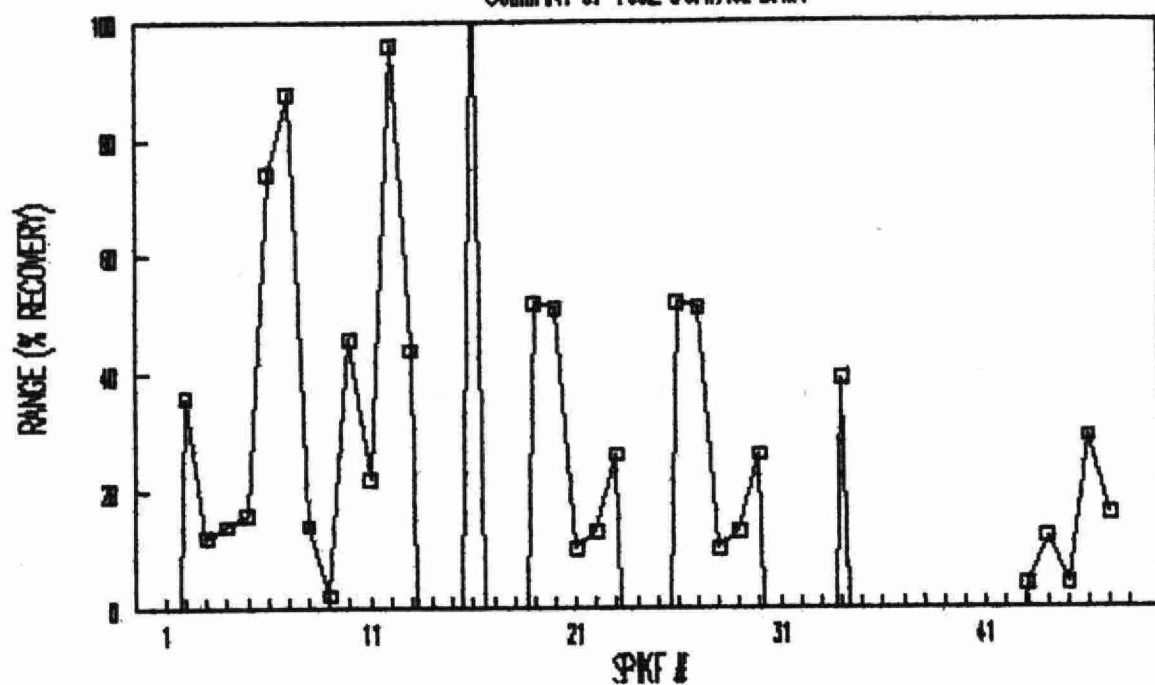
PFAOC: OPDDT

SUMMARY OF 1992 CONTROL DATA



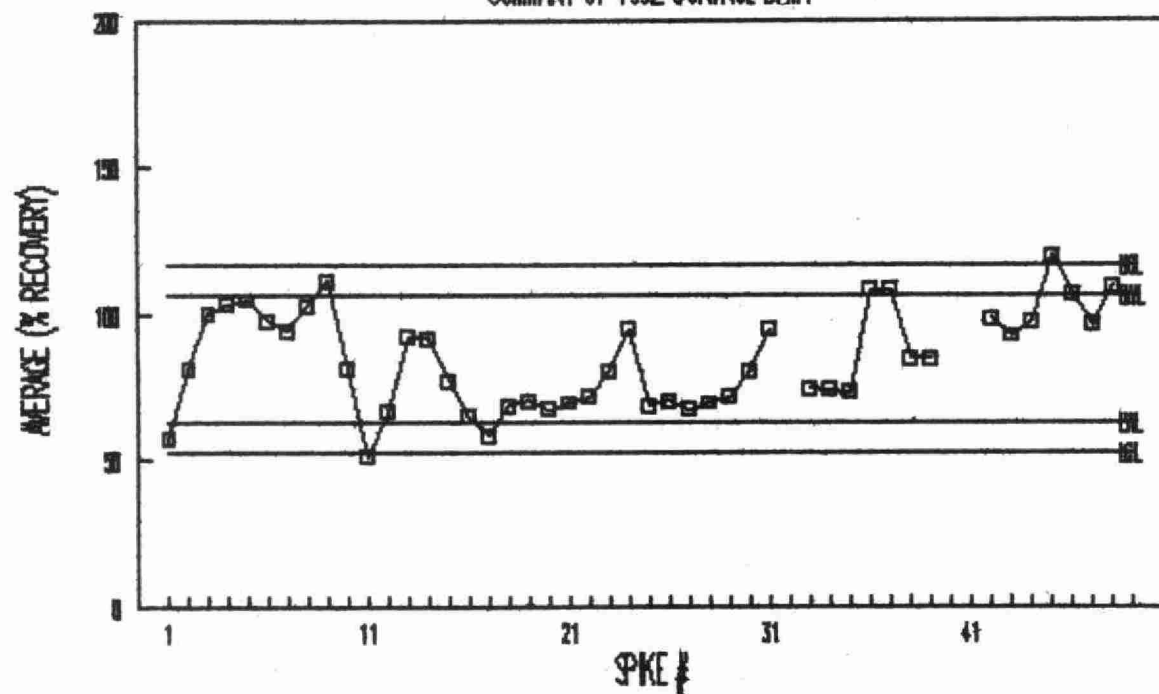
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SUMMARY OF 1992 CONTROL DATA



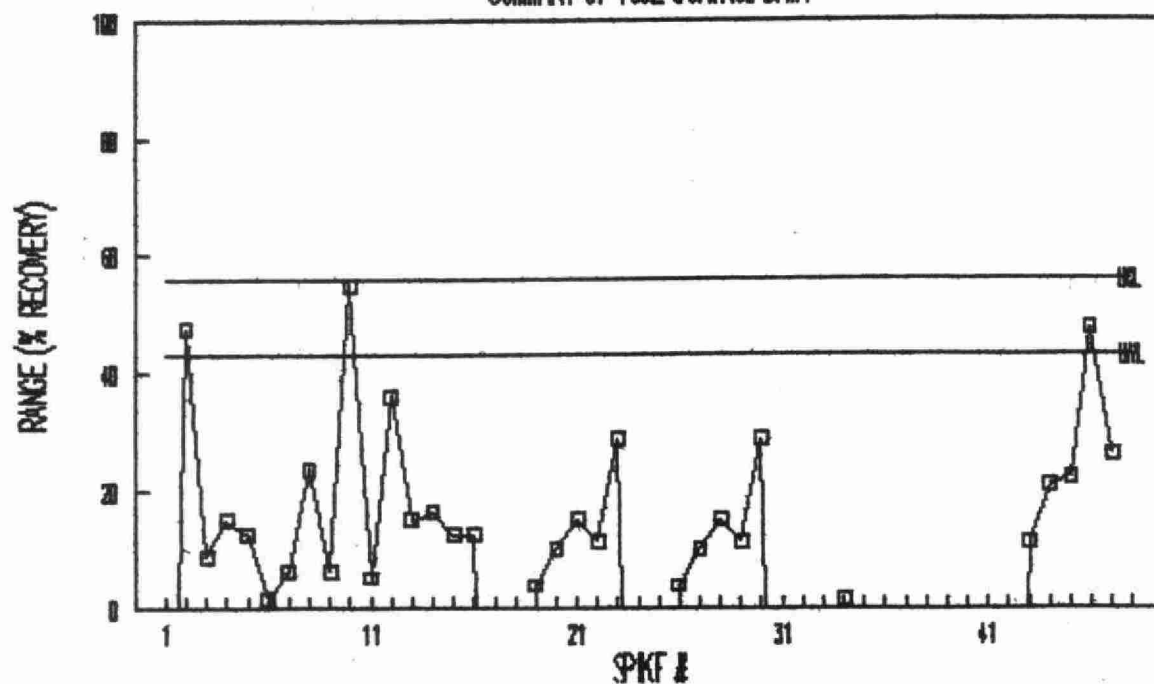
PFAOC: PPDDD

SUMMARY OF 1992 CONTROL DATA



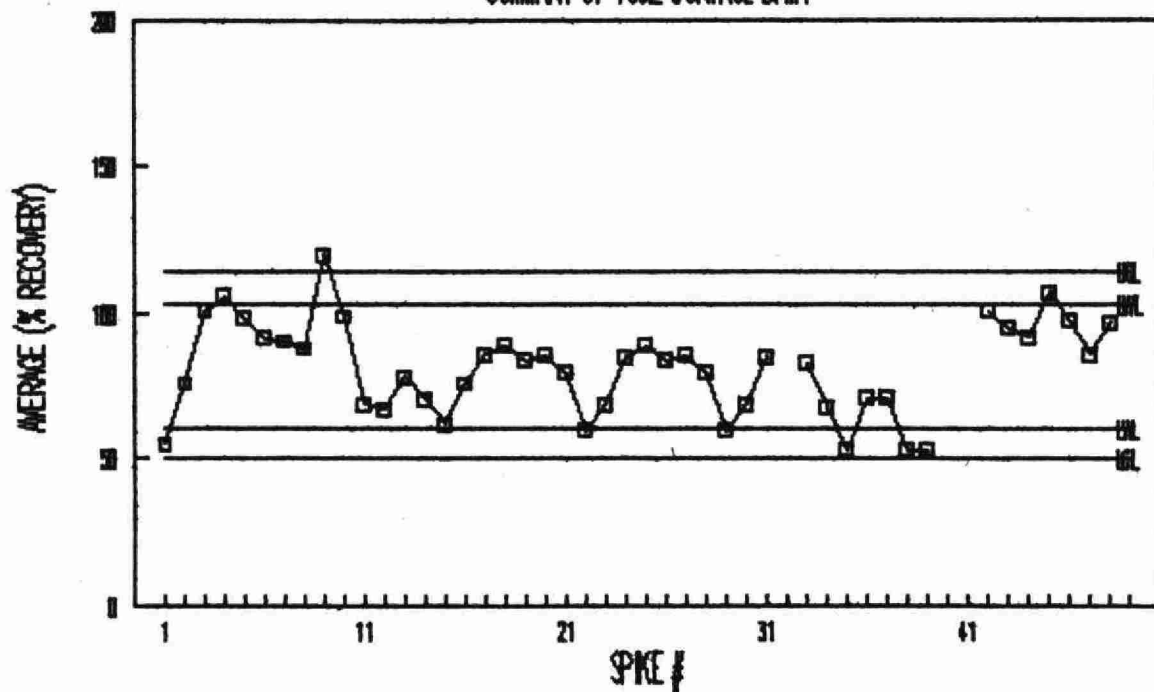
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SUMMARY OF 1992 CONTROL DATA



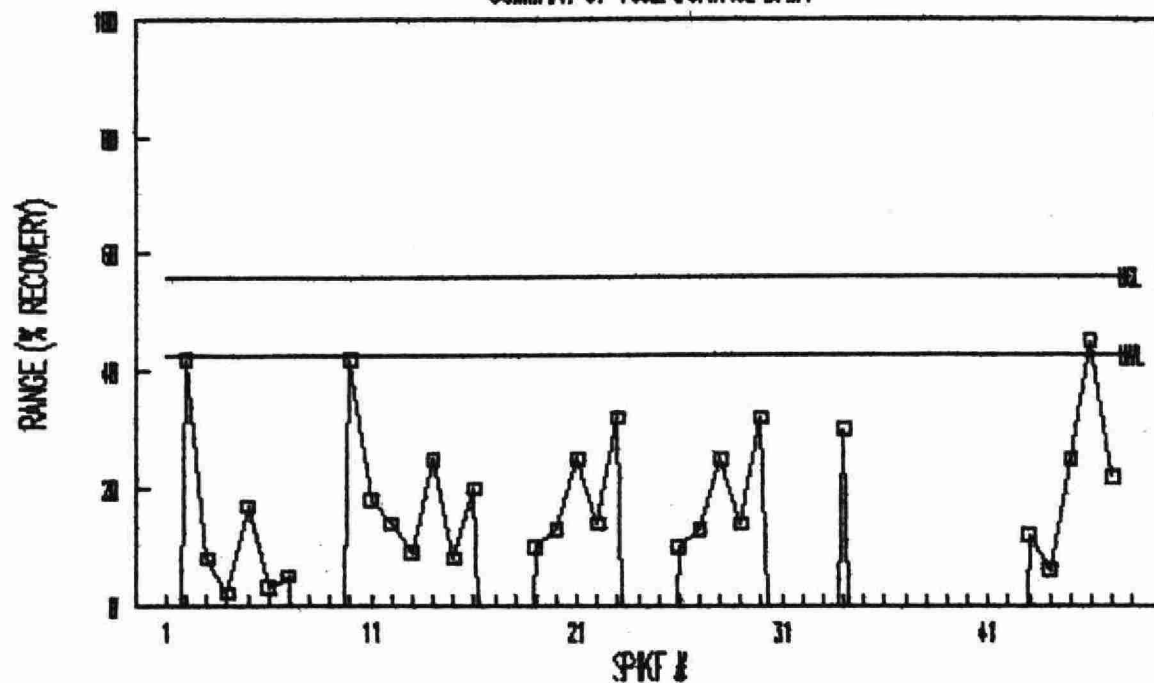
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SUMMARY OF 1992 CONTROL DATA



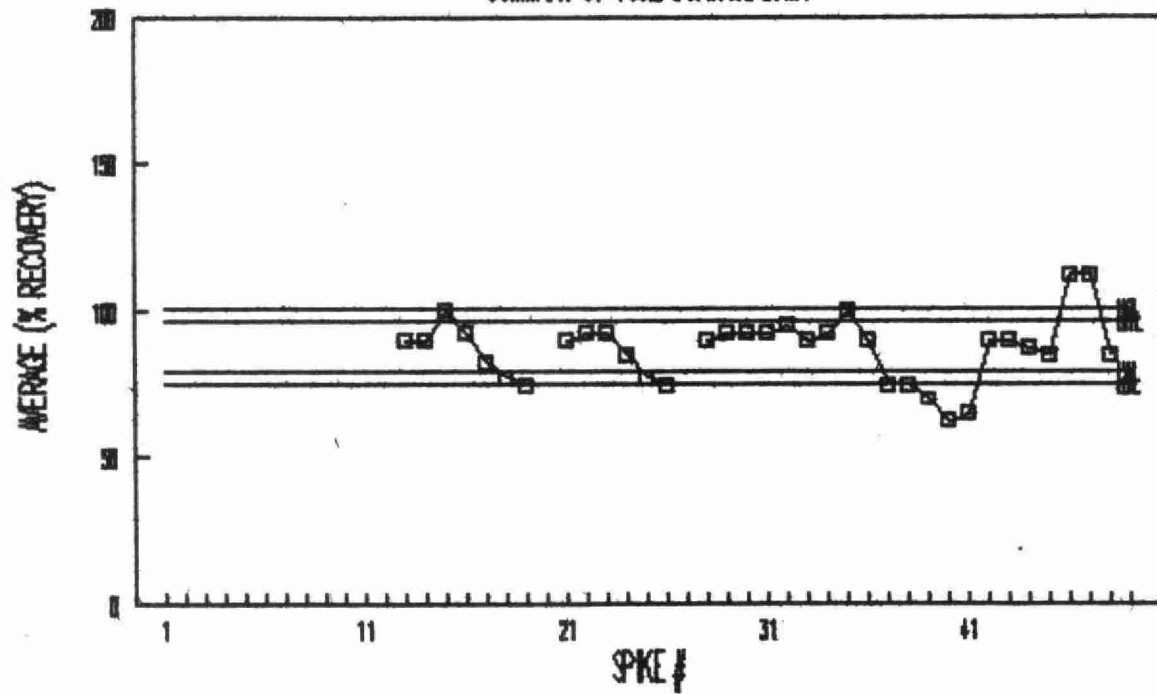
PFAOC: PPDDT

SUMMARY OF 1992 CONTROL DATA



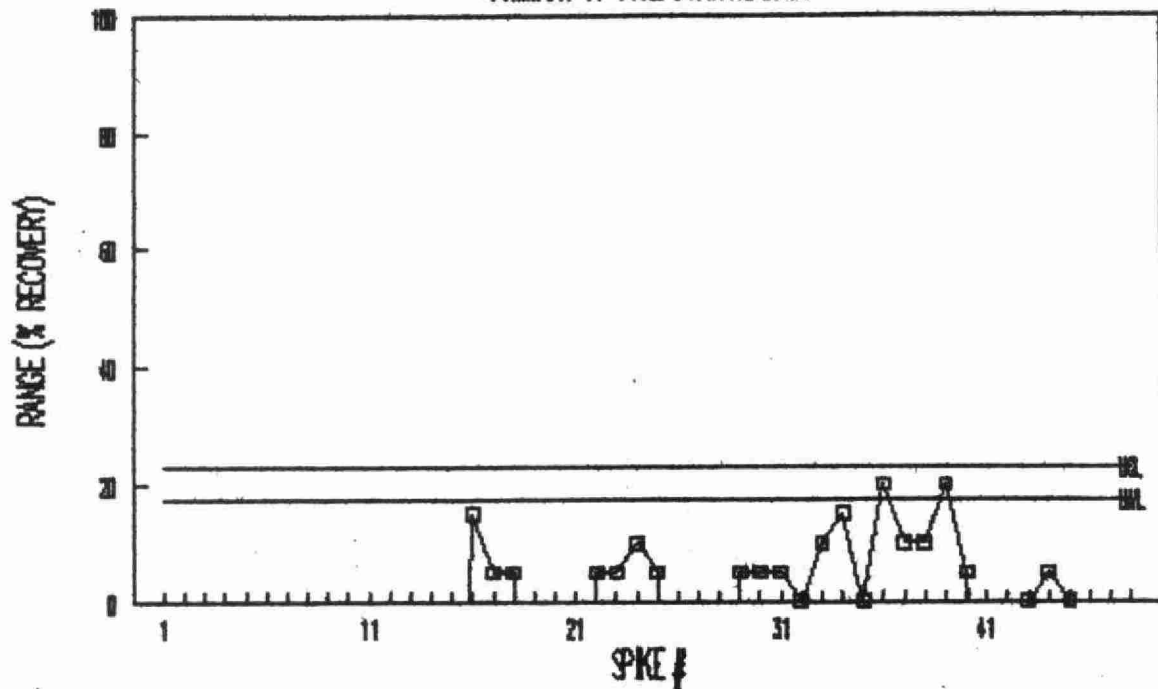
PFAOC: OCSTYR

SUMMARY OF 1992 CONTROL DATA



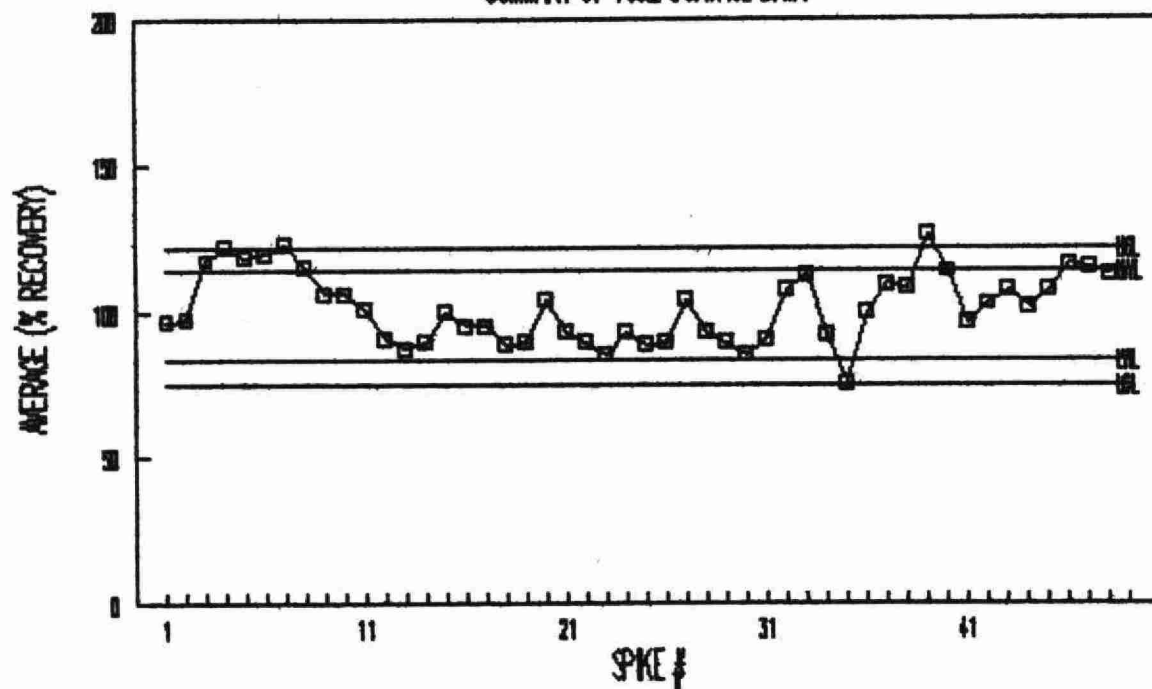
PFAOC: OCSTYR

SUMMARY OF 1992 CONTROL DATA



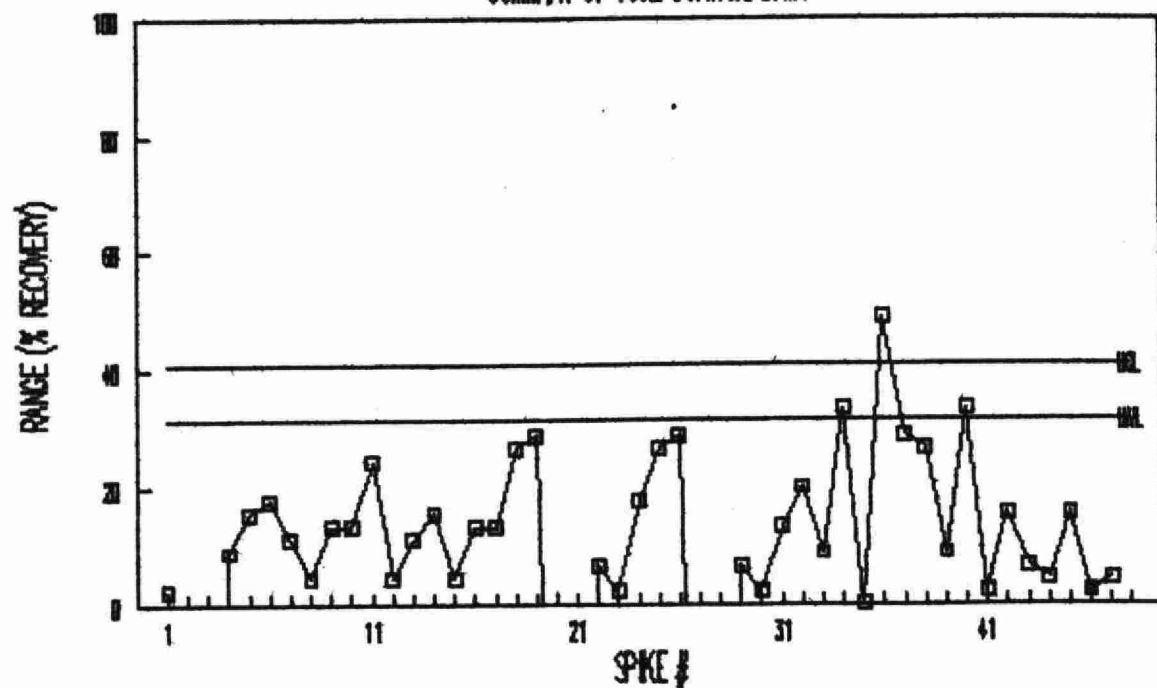
PFAOC: **209**

SUMMARY OF 1992 CONTROL DATA



PFAOC: **209**

SUMMARY OF 1992 CONTROL DATA



WASTEWATER

Workstation	Method Title	Catalogue No.
PWACB/OC	The Determination of Organo-chlorines Pesticides and Chloro-aromatics in Water and Effluent by GC-ECD.	E3165A
WWVOL	The Determination of Purgeable Organics in Effluent by GC-FID/MSD.	E3201A
PWRFA	The Determination of Resin and Fatty Acids in Water and Effluent by GC-ECD.	E3166A
TOMBAN/ TOMPAH	The Determination of Acid/Base and Neutral Compounds in Industrial Final Influent and Effluent by GC-MSD.	E3209A

ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: PWACB/OC E3159A

SAMPLE TYPE: WATER/EFFLUENT

UNIT: WASTEWATER

SUPERVISOR: Y. JONES

PRINCIPLE OF METHOD:

Chlorobenzenes (CB's) and chlorotoluenes form a class of compounds which are widely found as intermediates in the heavy chemical industry.

The method consists of an extraction with dichloromethane, followed by drying with sodium sulphate and evaporation using a rotary evaporator. This is then followed by a cleanup/separation using florisil, evaporation using a Vortex evaporator and final analysis using dual ECD (Electron Capture Detector) and dual capillary Columns.

PARAMETERS MEASURED:

The following parameters are measured by this method:

Parameters	Test Codes
Hexachloroethane	X2HCE
1,3,5-trichlorobenzene	X2135
1,2,3-trichlorobenzene	X2123
1,2,4-trichlorobenzene	X2124
Hexachlorobutadiene	X1HCB
2,4,5-trichlorotoluene	X2T245
2,3,6-trichlorotoluene	X2T236
1,2,4,5-tetrachlorobenzene	X21245
1,2,3,5-tetrachlorobenzene	X21235
2,6-a-trichlorotoluene	X2T26A
1,2,3,4-tetrachlorobenzene	X21234
Pentachlorobenzene	X2PNCB
Octachlorostyrene	X2OCST

As well, the following parameters are measured by this method as part of the same scan, but are reported on the Workstation PWAOC.

Parameters	Test Codes
Hexachlorobenzene	X2HCB
Heptachlor	P1HEPT
Aldrein	P1ALDR
G-BHC	P1BHCG

B-BHC
A-BHC
Heptachlor Epoxide
Oxychlordane
A-chlordane
G-chlordane
Thiodan I
Thiodan II
Dieldrin
pp'DDE
Endrin
op'DDT
pp"DDT
pp"DDD
Mirex
Thiodan Sulphate
Methoxychloro (DMDT)

P1BHCB
P1BHCA
P1HEPE
P1OCHL
P1CHLA
P1CHLG
P1END1
P1END2
P1DIEL
P1PPDE
P1ENDR
P1OPDT
P1PPDT
P1PPDD
P1MIRX
P1ENDS
P1DMDT

REPORTING RESULTS:

Results are reported in ng/L.

METHOD CONTROL:

Blanks - samples carried through the entire sample extraction cleanup and analysis procedure. Difference between these samples and real samples is the blank does not include the sample matrix. It is a glassware/reagent blank that monitors the consistency and quality of every procedure and reagent used in a specific analysis technique.

Spikes - Standards in an effluent carried through the entire analytical procedure. The Spiking Solution is a concentration of 2 to 20 times that indicated for the Instrumental Standard. This provides in-sample concentrations of ppt (liquid samples) and ppt (solid samples).

Duplicate spikes are expected to agree within 5 to 10%.

Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC sample.

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1991-92 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

If samples are not in correct containers with 800 Ml sample size, the samples will not be analyzed.

Samples must be collected in 1L amber bottles with teflon or foil lined screw caps.

Bottles are pre-treated.

Due to the nature of the samples some parameters, even after florisil cleanup and separation, may not be analyzed. These are usually the more polar compounds which require a polar solvent to elute them, with many impurities, from the florisil column.

UNIT: WASTEWATER
 WORKSTATION: PWAOC/CB
 TIME PERIOD: DATA 1992
 NO. OBSERVATIONS: 106

MATRIX: WATER/
 EFFLUENT
 INSTRUMENT: GC
 COLUMNS: MIXTURE
 DB-1/1701

YEARLY CALCULATION

PARAMETER COMPOUND	COLUMN	SPIKE NG/L	AVG. SPK. % REC.	STD. DEV. %REC.	% C.V.
1. HCE	: DB-1	: 30	: 63	: 41	: 65
2. 135CB	: DB-1	: 30	: 73	: 23	: 32
3. 124CB	: DB-1	: 30	: 104	: 59	: 57
4. 123CB	: DB-1	: 30	: 82	: 28	: 34
5. HCBD	: DB-1	: 30	: 58	: 21	: 37
6. 245TCT	: DB-1	: 30	: 82	: 32	: 39
7. 236TCT	: DB-1	: 30	: 67	: 23	: 35
8. 1235CB	: 1701	: 30	: 84	: 27	: 32
9. 1245CB	: 1701	: 30	: 92	: 35	: 38
10. A25TCT	: DB-1	: 30	: 87	: 33	: 38
11. 1234CB	: DB-1	: 30	: 79	: 26	: 33
12. PENTCB	: DB-1	: 30	: 80	: 22	: 28
13. aBHC	: DB-1	: 60	: 83	: 22	: 27
14. bBHC	: 1701	: 60	: 84	: 29	: 34
15. HCB	: 1701	: 15	: 85	: 34	: 40
16. gBHC	: DB-1	: 60	: 96	: 32	: 33
17. HEPT	: DB-1	: 60	: 100	: 62	: 62
18. ALDRIN	: DB-1	: 60	: 100	: 41	: 41
19. HEPOX	: DB-1	: 150	: 168	: 89	: 53
20. OCSTYR	: 1701	: 30	: 89	: 55	: 62

UNIT: WASTEWATER
 WORKSTATION: PWAOC/CB
 TIME PERIOD: DATA1992
 NO. OBSERVATIONS: 106

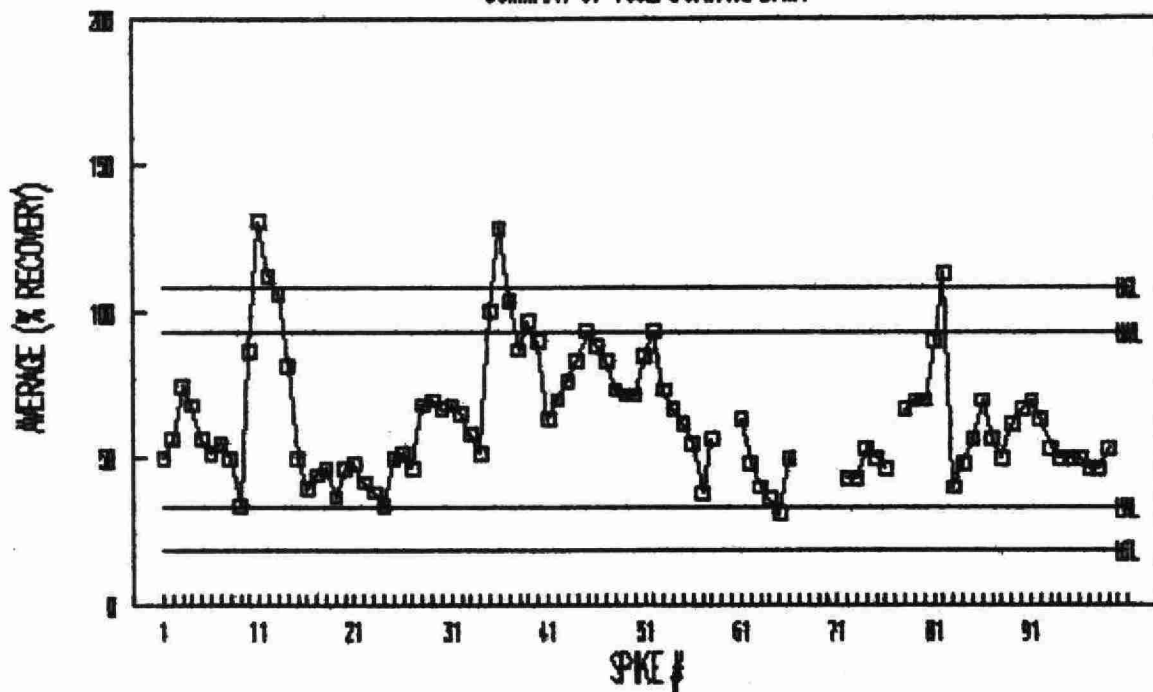
MATRIX: EFFLUENT/
 WATER
 INSTRUMENT: GC
 COLUMNS: MIXTURE
 DB-1/1701

YEARLY CALCULATION

PARAMETER COMPOUND	COLUMN	SPIKE NG/L	AVG. SPK. % REC.	STD. DEV. %REC.	% C.V.
21.OXCHLO	: 1701	: 60	: 161	: 97	: 60
22.gCHLDN	: DB-1	: 60	: 96	: 26	: 27
23.ENDOSI	: DB-1	: 60	: 63	: 31	: 49
24.aCHLDN	: DB-1	: 60	: 96	: 27	: 28
25.ppDDE	: 1701	: 60	: 108	: 62	: 57
26.DIELDR	: 1701	: 120	: 89	: 40	: 45
27.ENDRIN	: DB-1	: 120	: 63	: 27	: 43
28.ENDOS2	: DB-1	: 120	: 72	: 46	: 65
29.ppDDD	: DB-1	: 150	: 125	: 49	: 40
30.opDDT	: DB-1	: 150	: 117	: 42	: 36
31.ENDOSS	: DB-1	: 120	: 91	: 56	: 62
32.ppDDT	: DB-1	: 150	: 119	: 56	: 47
33.DMDT	: DB-1	: 300	: 116	: 59	: 51
34.MIREX	: DB-2	: 150	: 113	: 38	: 34
35.135TBB	: DB-1	: 40	: 72	: 19	: 27

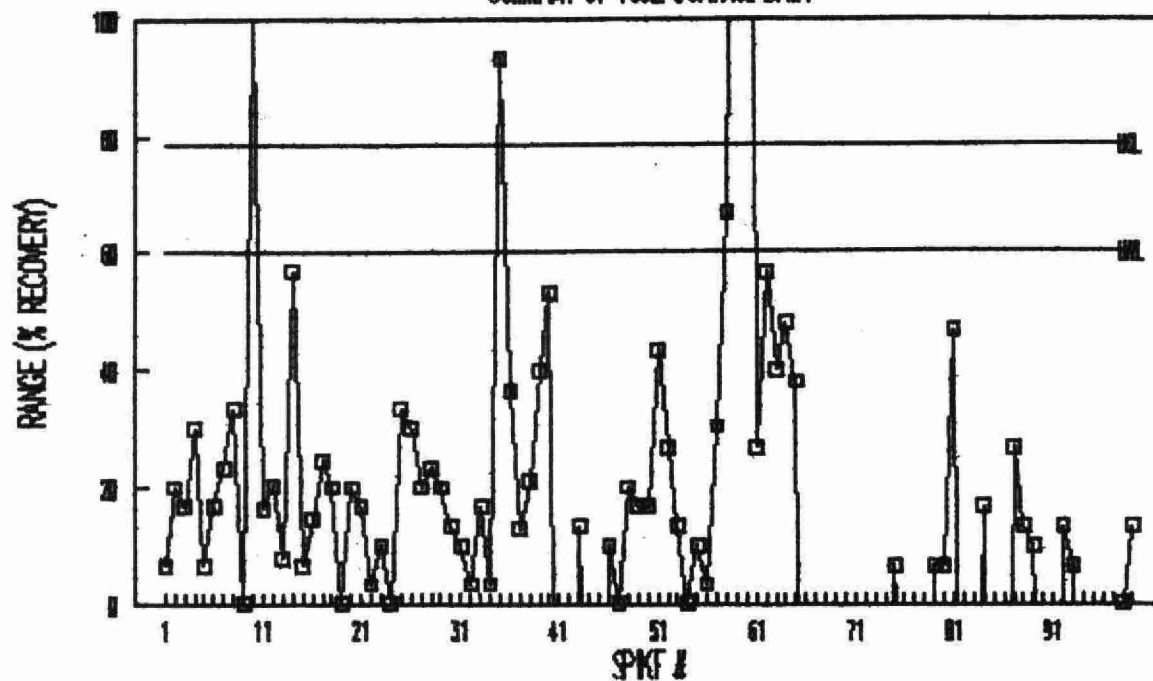
PWACB/OC: HCE

SUMMARY OF 1992 CONTROL DATA



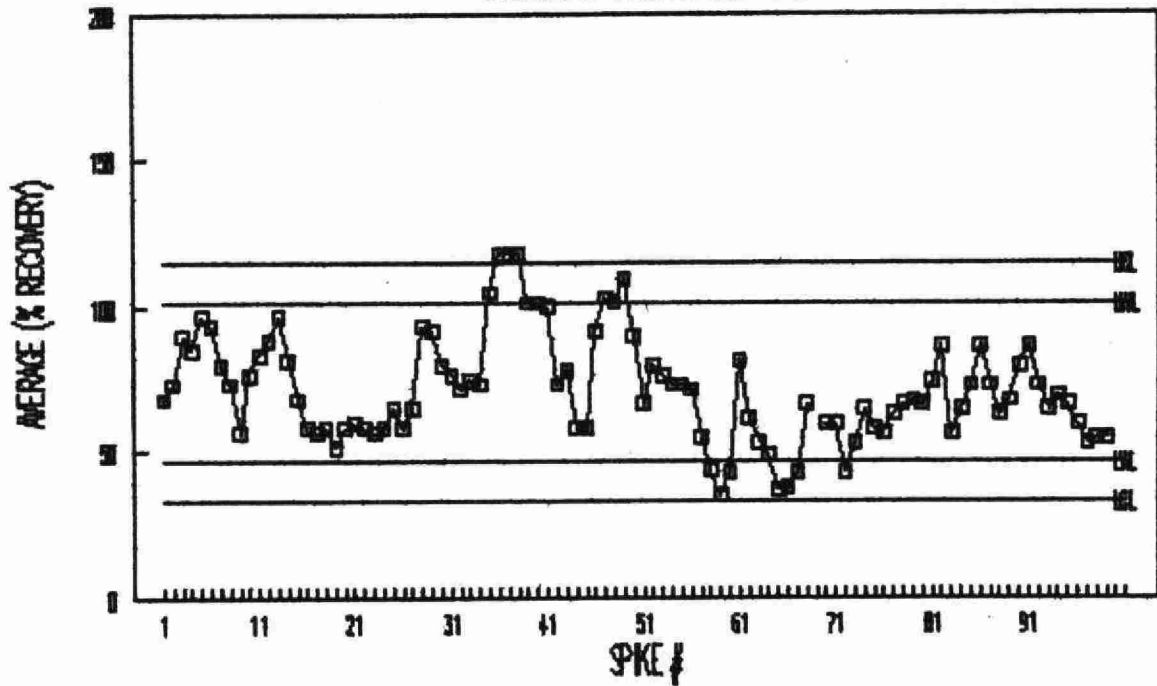
PWACB/OC: HCE

SUMMARY OF 1992 CONTROL DATA



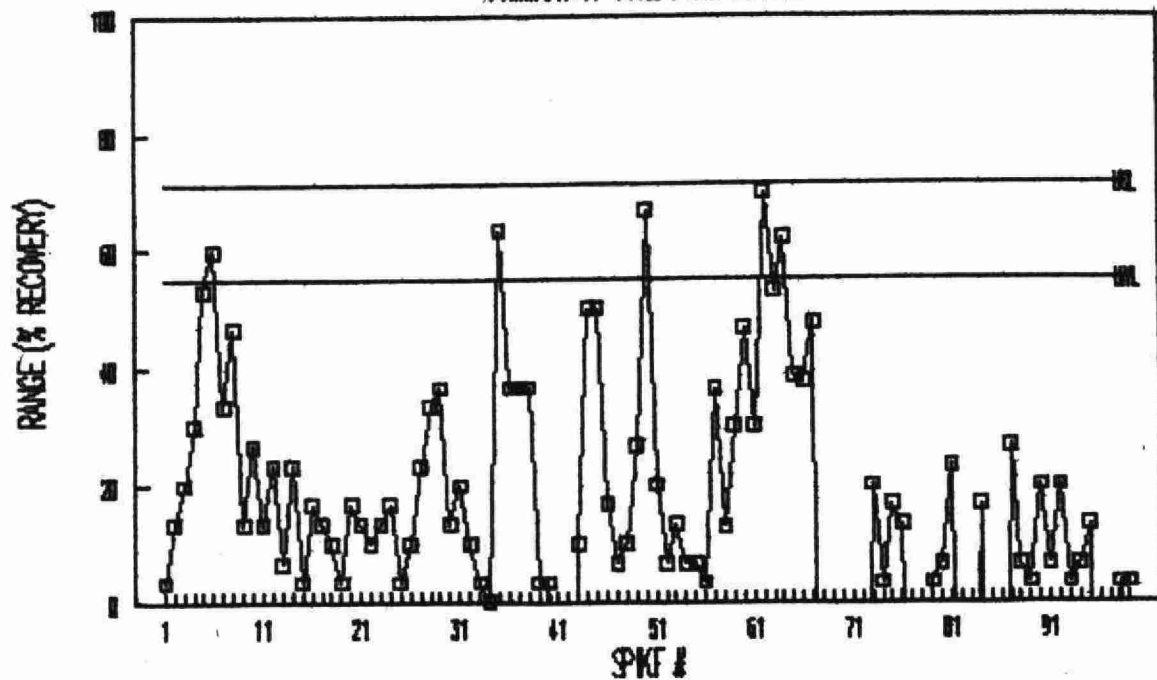
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SUMMARY OF 1992 CONTROL DATA



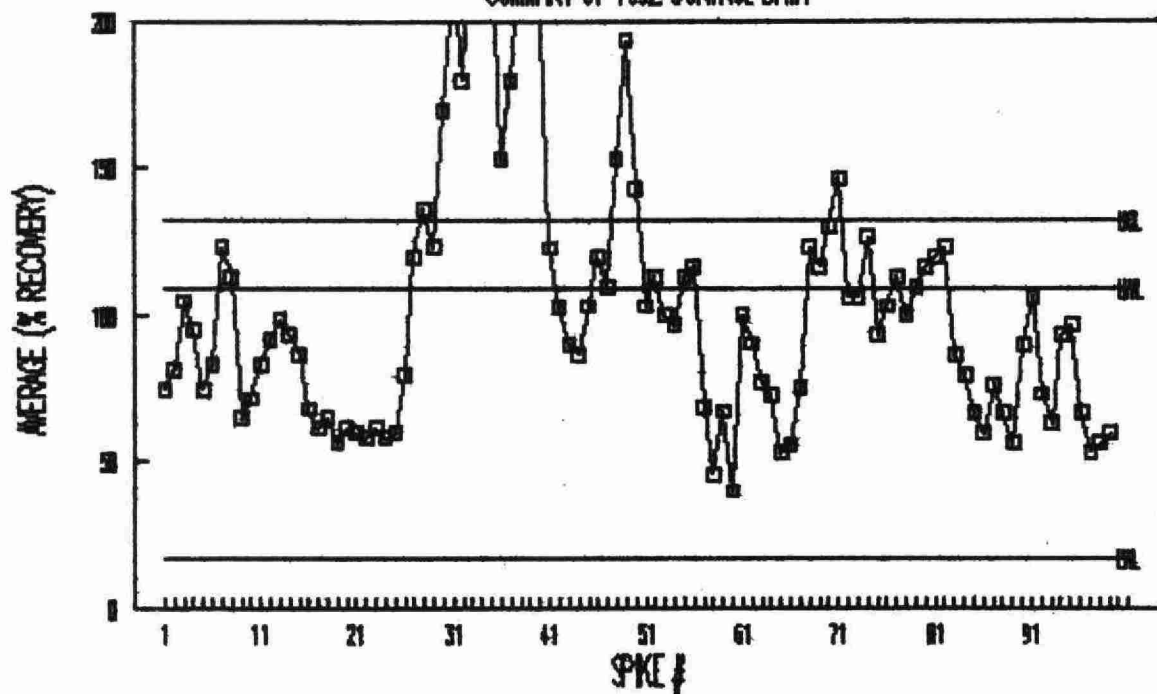
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SUMMARY OF 1992 CONTROL DATA



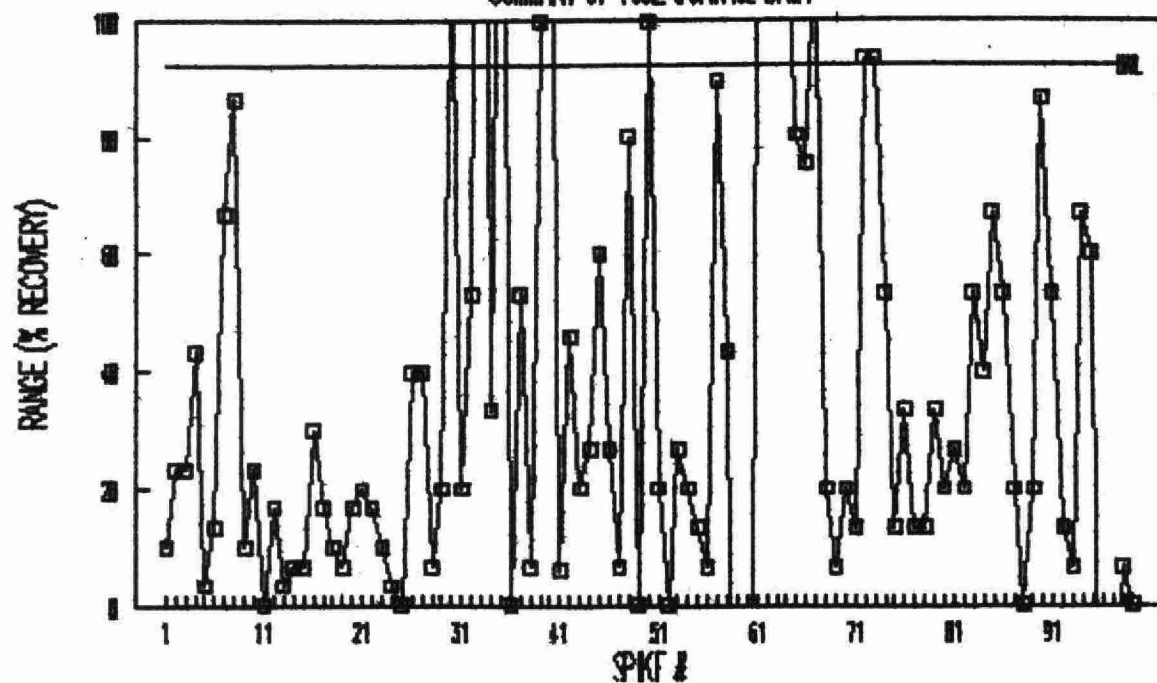
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SUMMARY OF 1992 CONTROL DATA



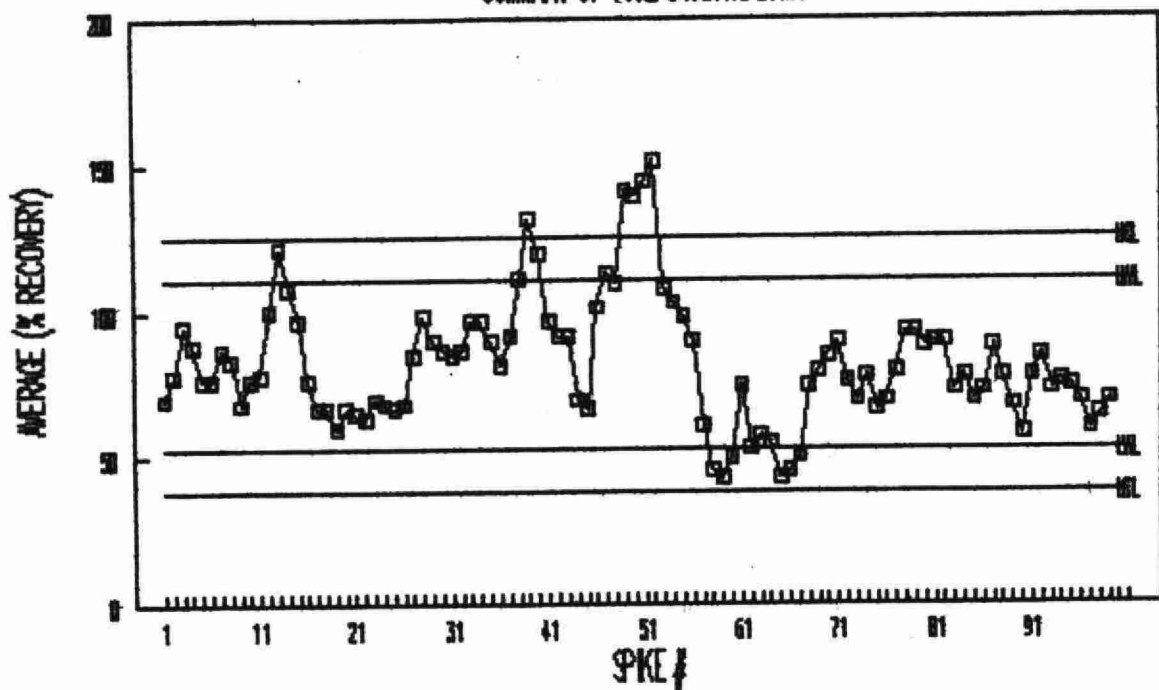
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SUMMARY OF 1992 CONTROL DATA



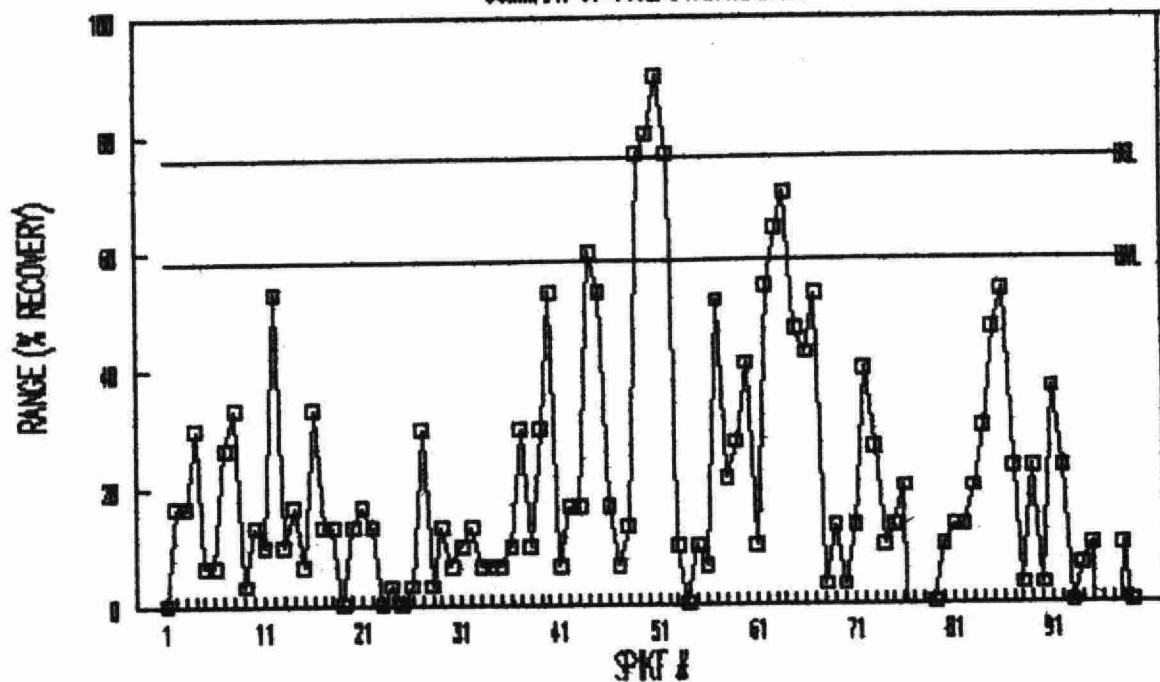
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SUMMARY OF 1992 CONTROL DATA



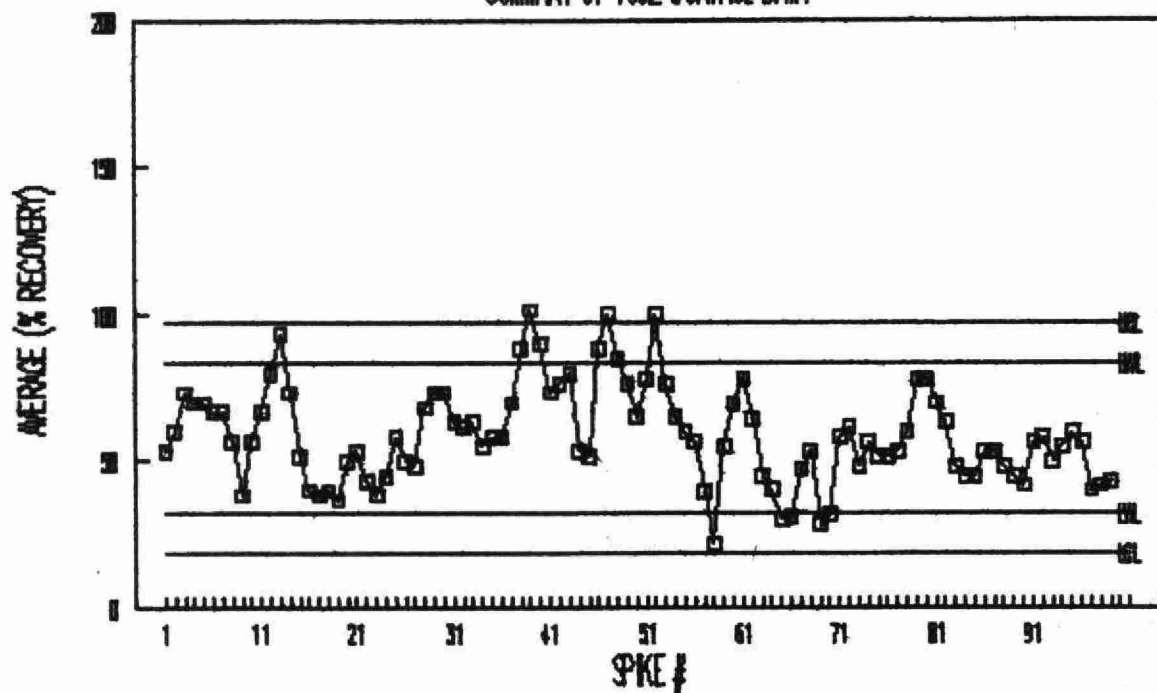
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SUMMARY OF 1992 CONTROL DATA



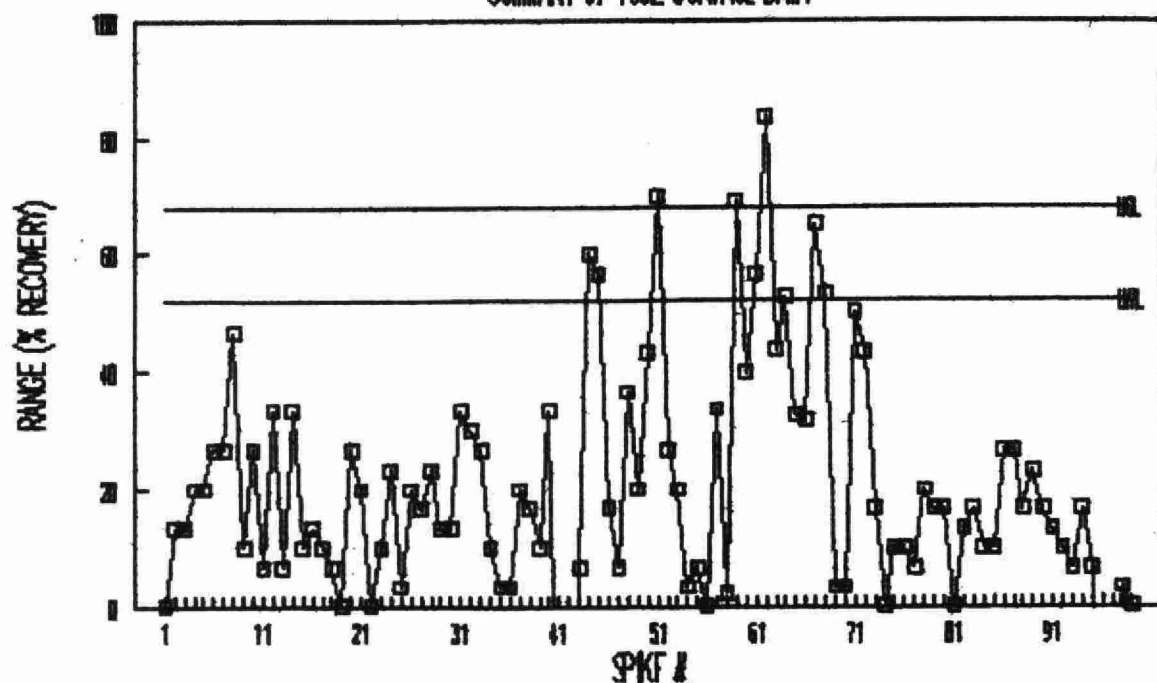
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SUMMARY OF 1992 CONTROL DATA



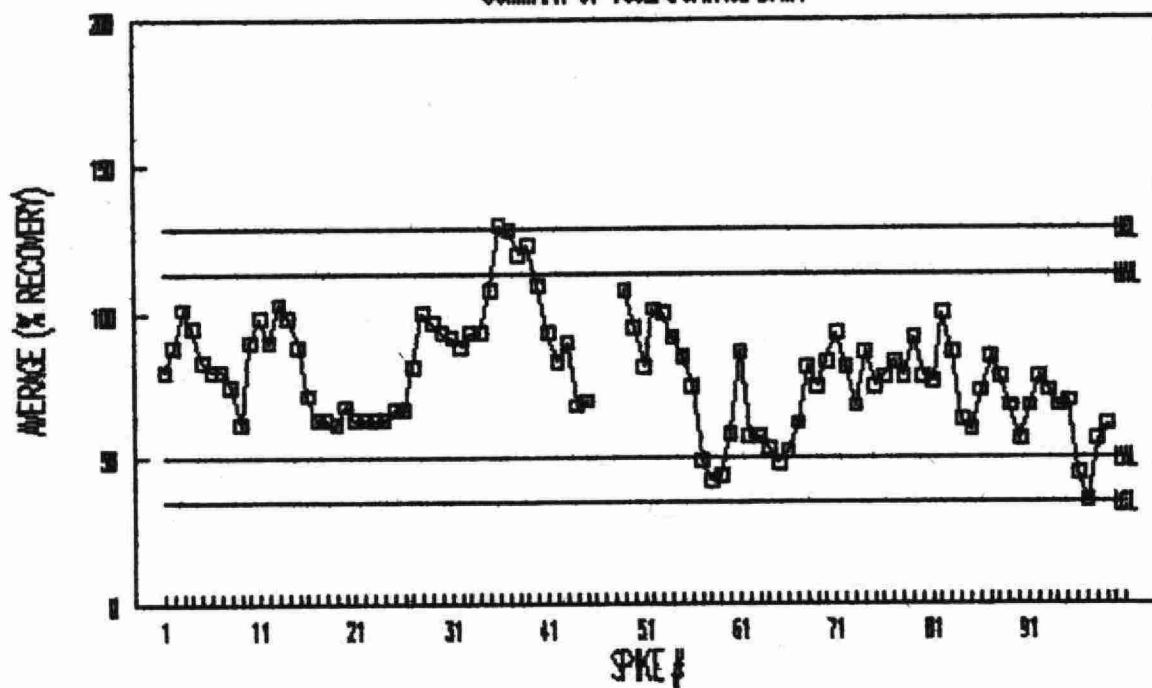
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SUMMARY OF 1992 CONTROL DATA



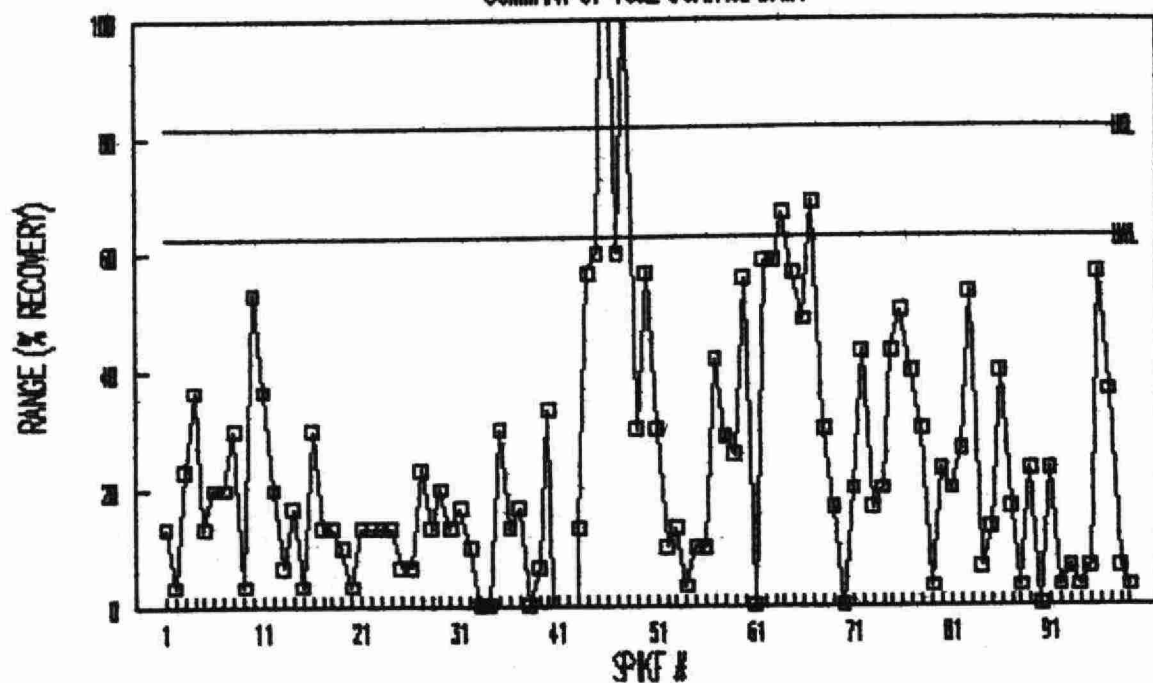
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SUMMARY OF 1992 CONTROL DATA



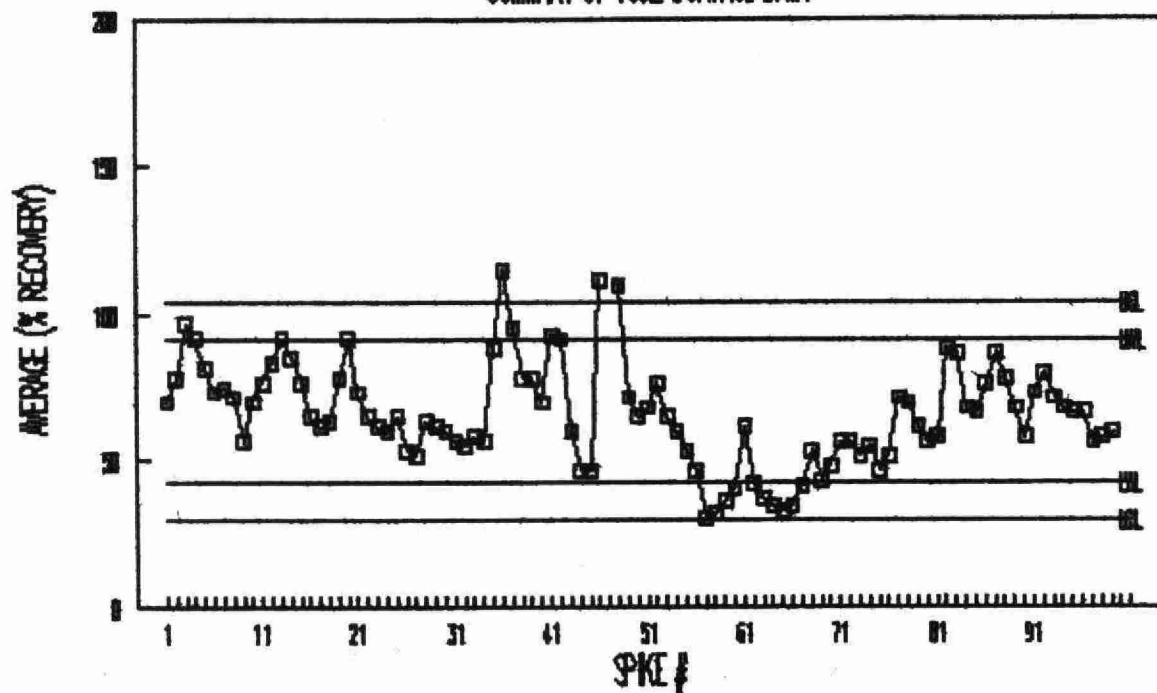
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SUMMARY OF 1992 CONTROL DATA



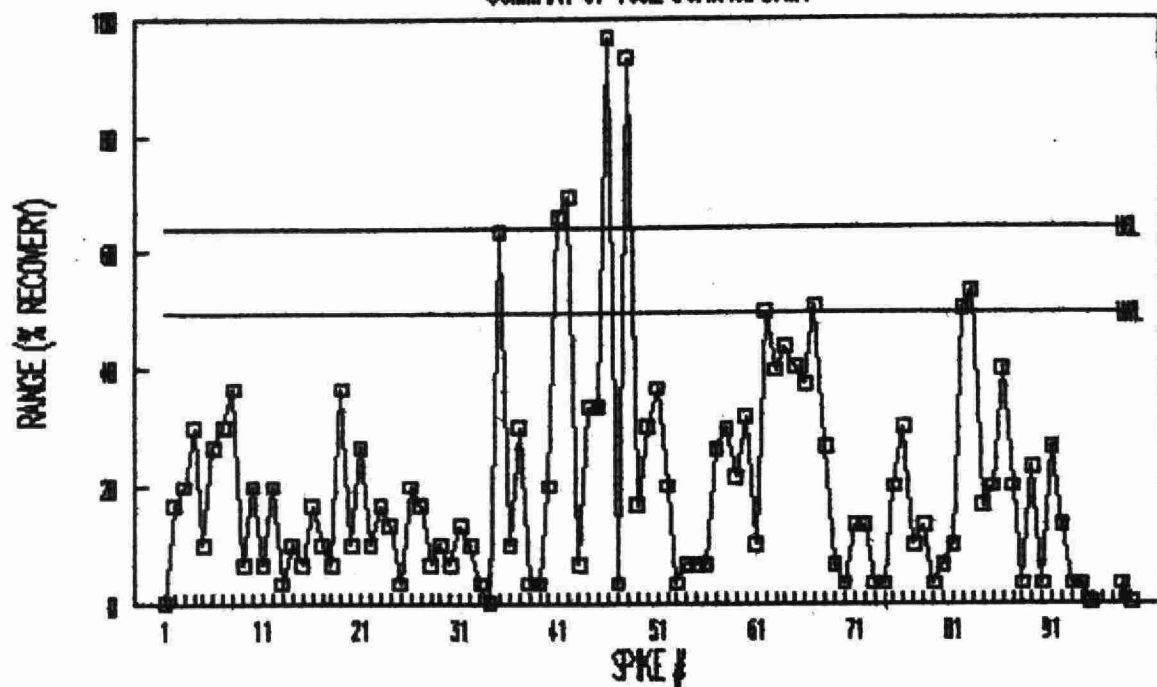
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SUMMARY OF 1992 CONTROL DATA



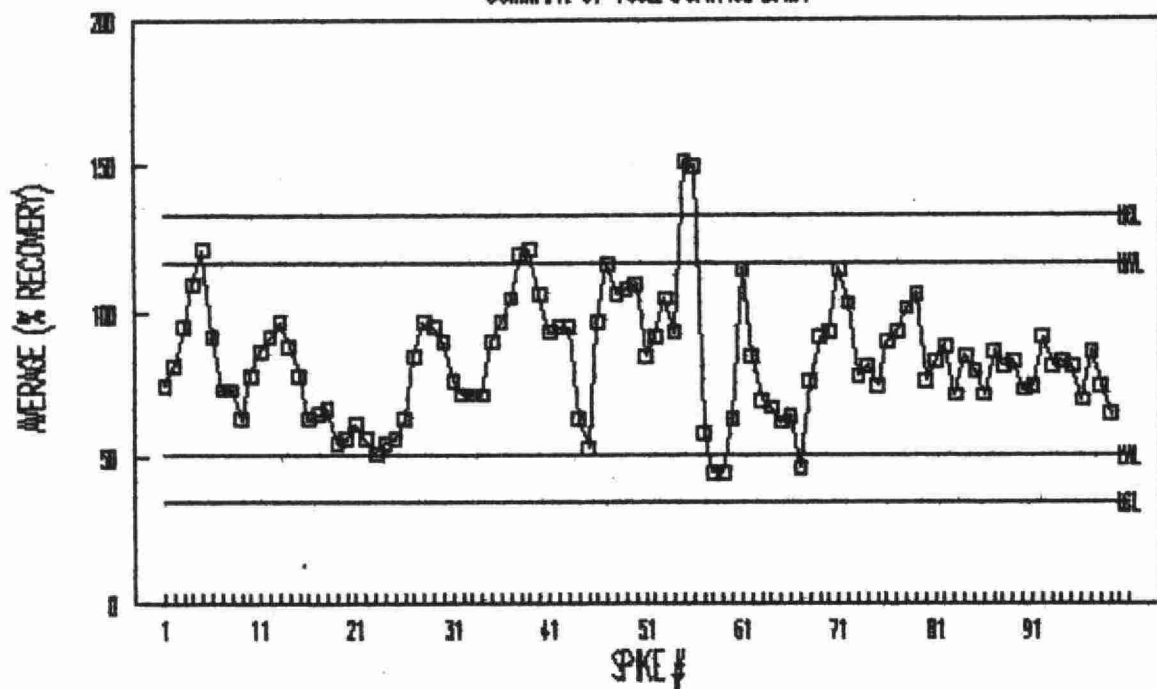
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SUMMARY OF 1992 CONTROL DATA



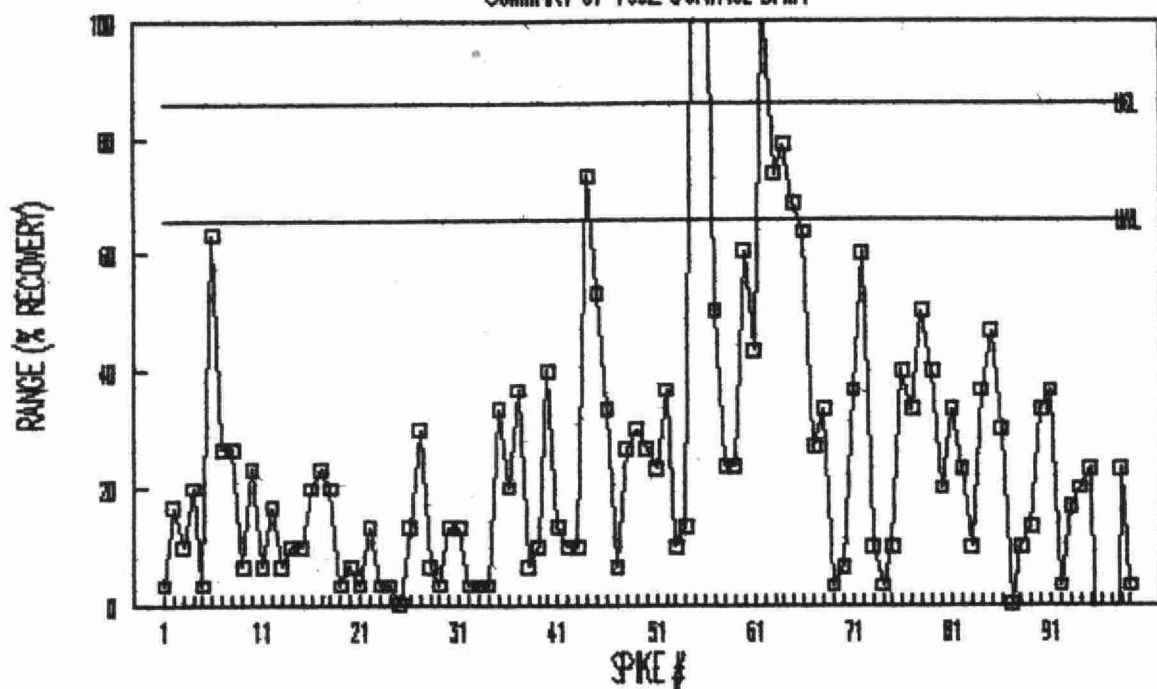
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SUMMARY OF 1992 CONTROL DATA



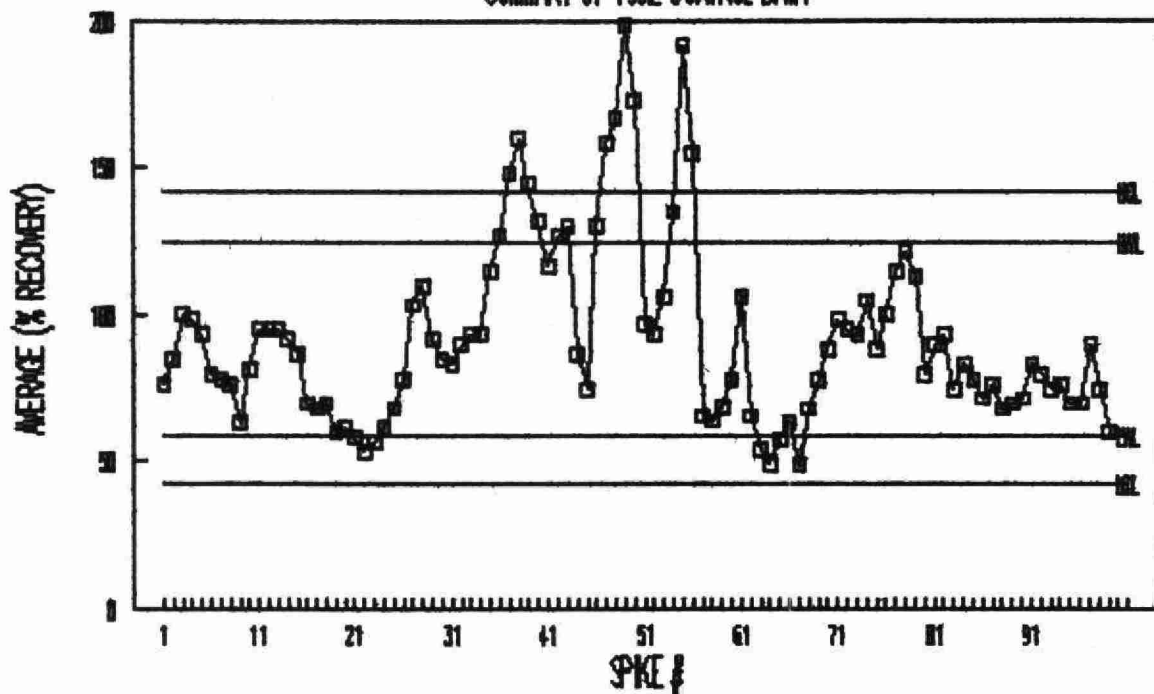
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SUMMARY OF 1992 CONTROL DATA



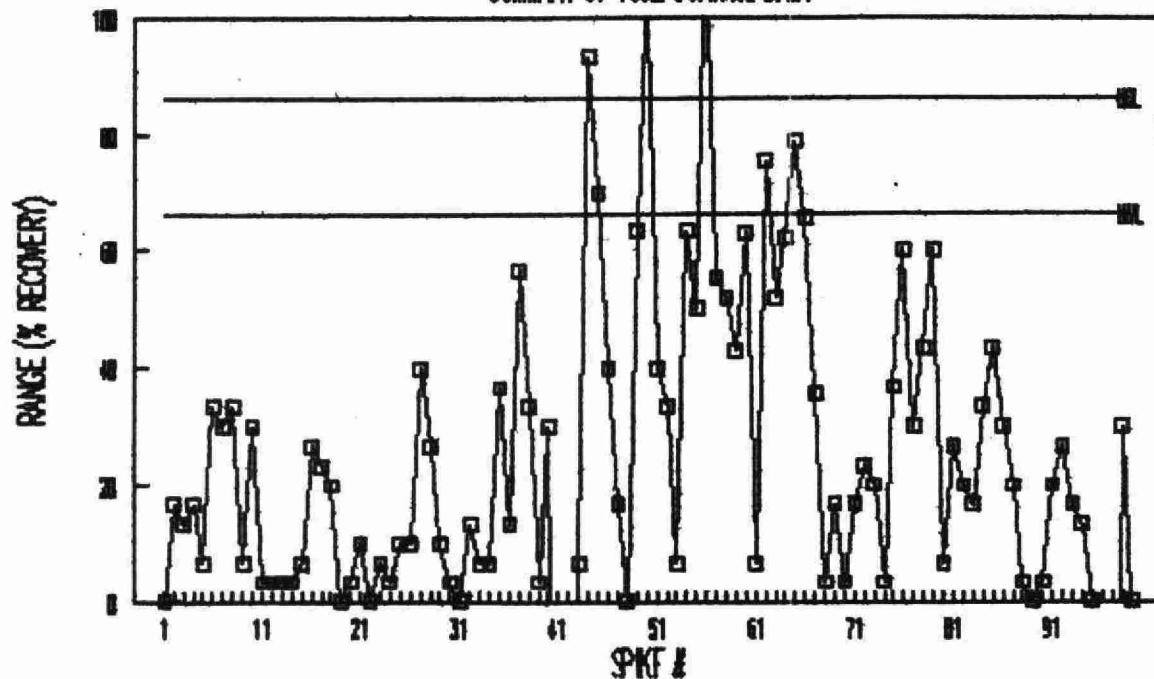
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SUMMARY OF 1992 CONTROL DATA



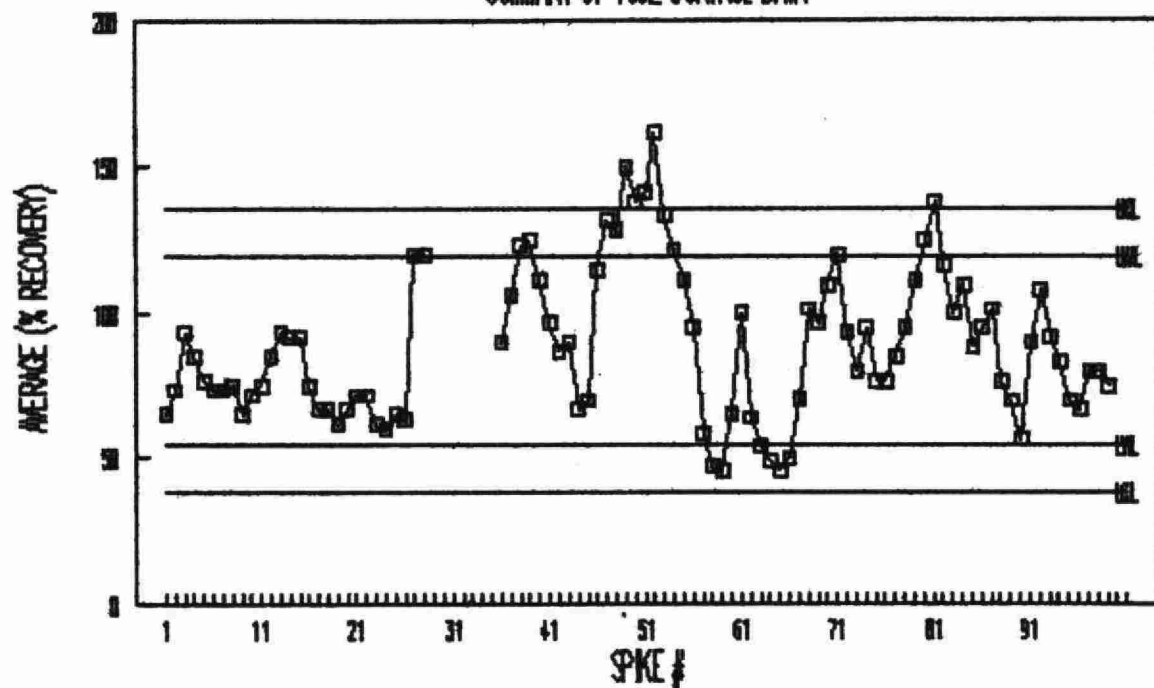
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SUMMARY OF 1992 CONTROL DATA



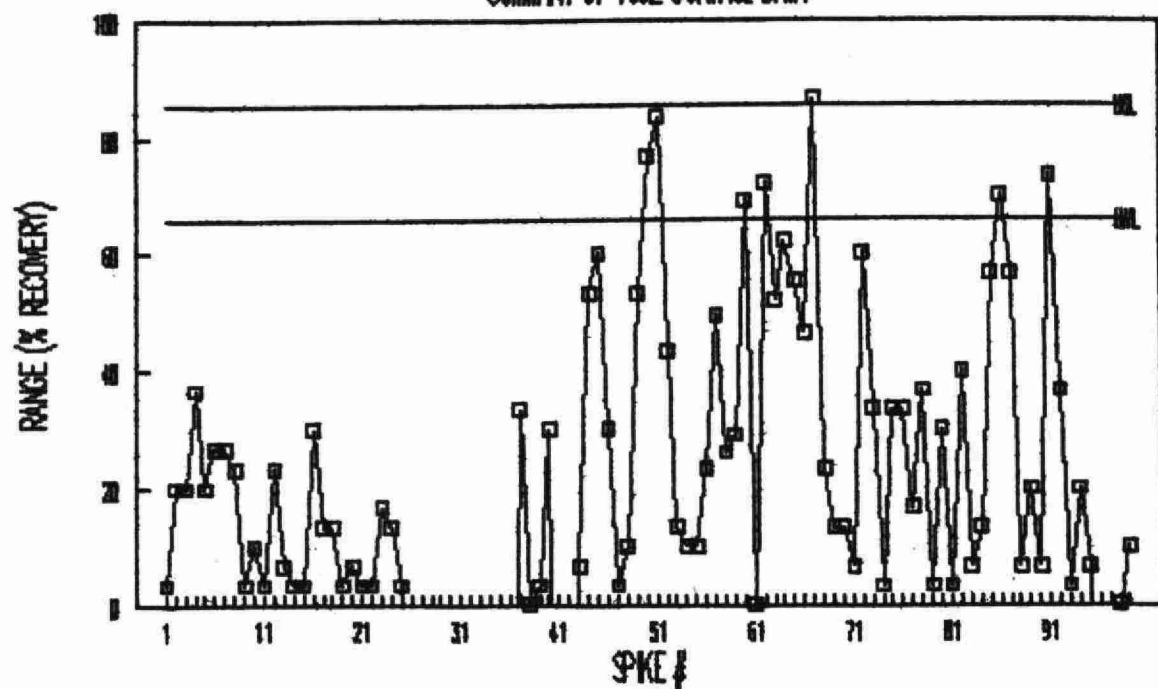
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SUMMARY OF 1992 CONTROL DATA

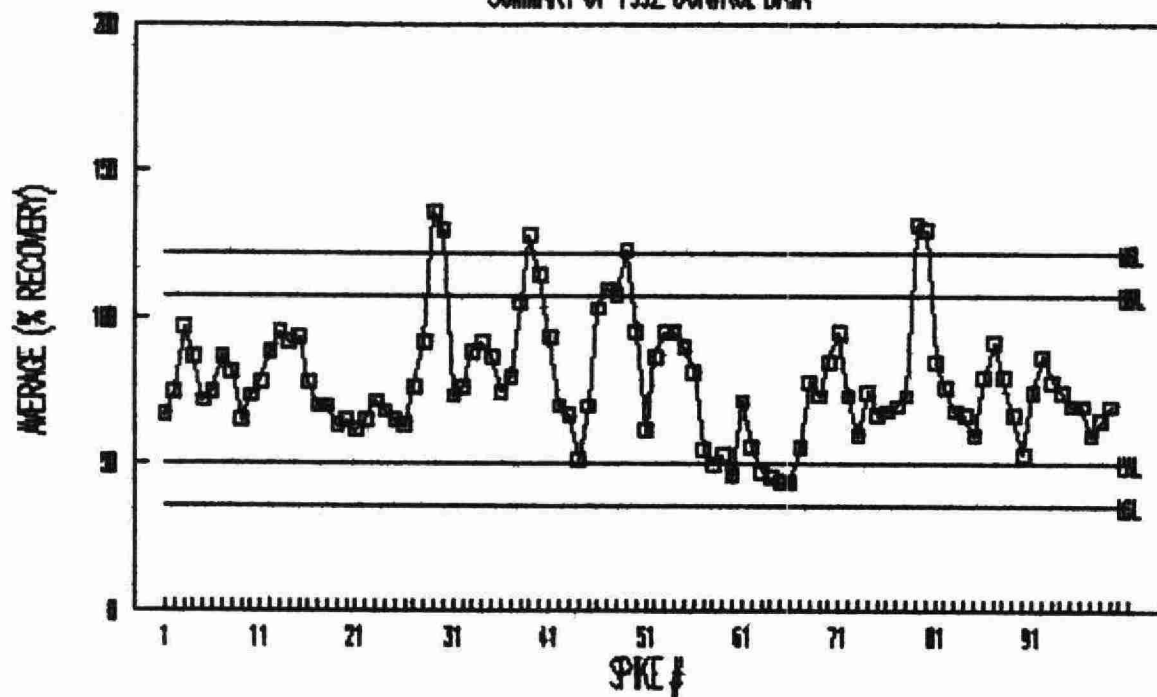


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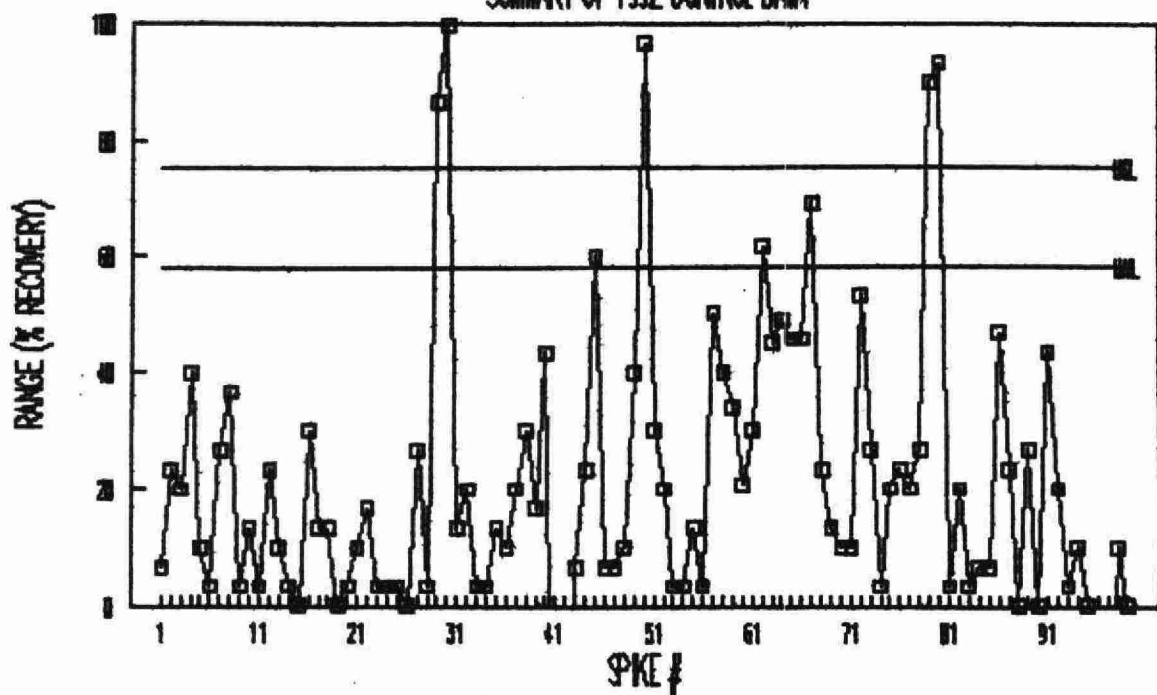
SUMMARY OF 1992 CONTROL DATA



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SUMMARY OF 1992 CONTROL DATA

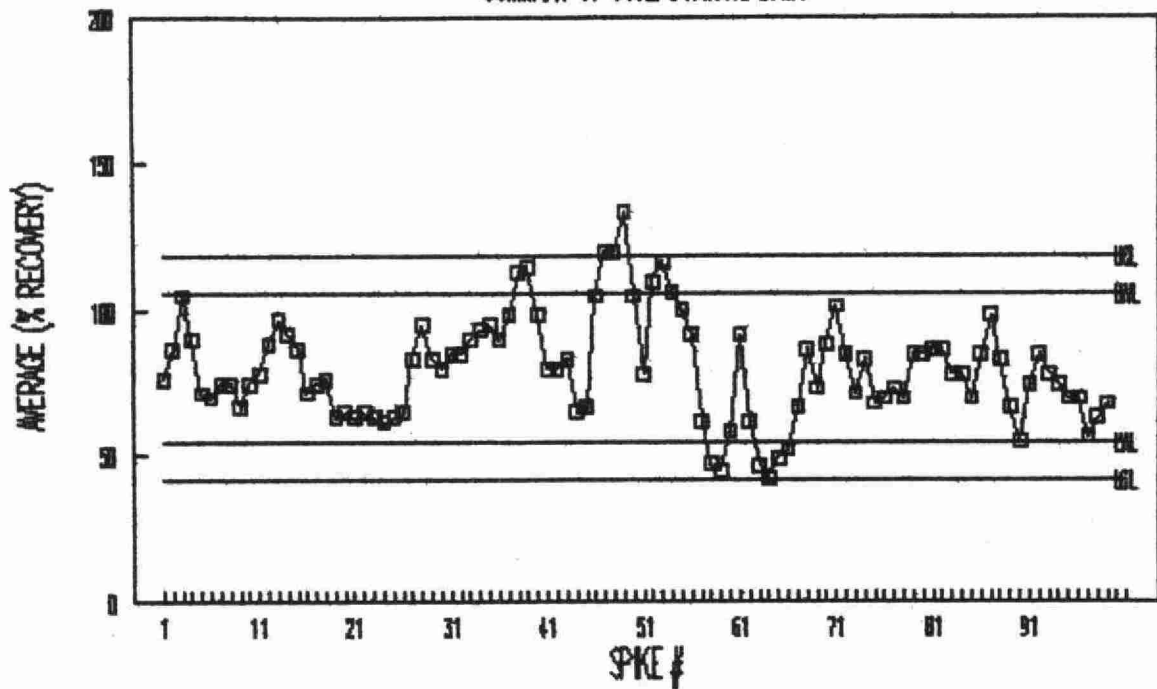


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SUMMARY OF 1992 CONTROL DATA

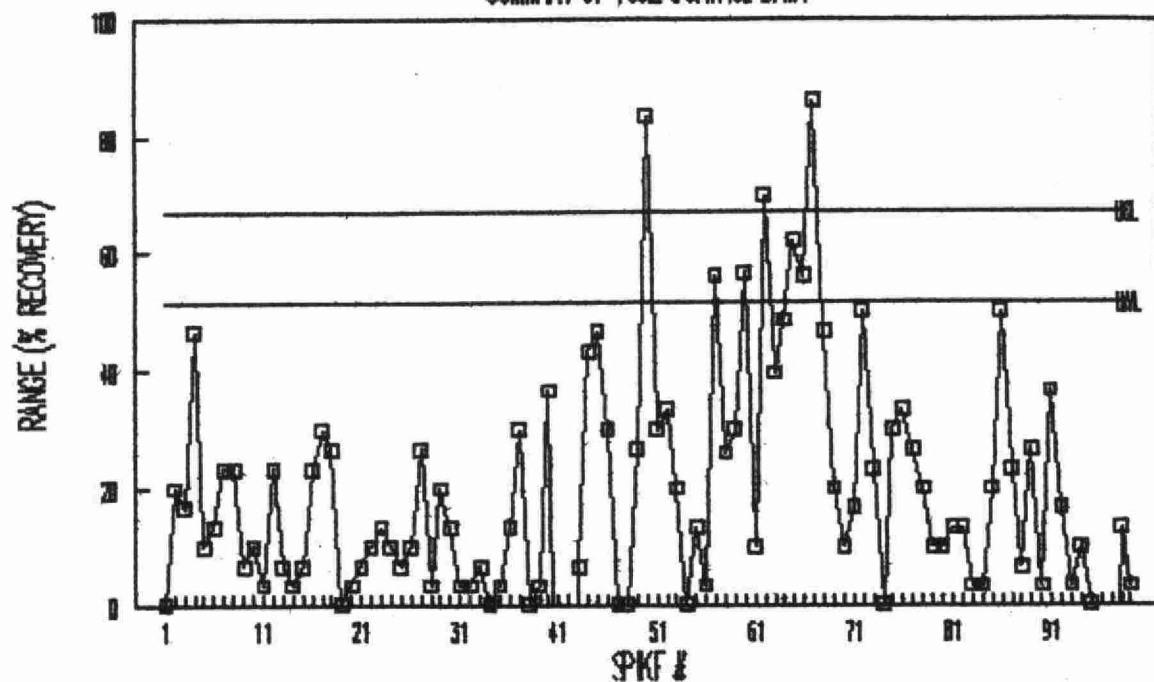


2

PWACB/OC: PENTCB
SUMMARY OF 1992 CONTROL DATA

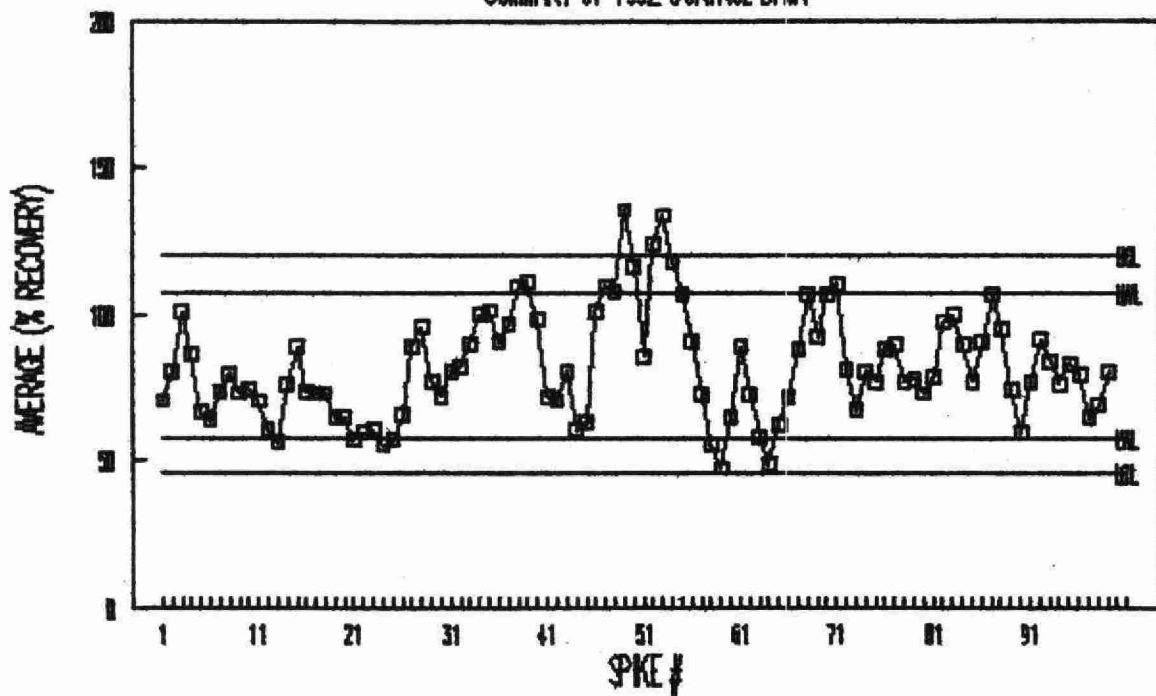


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SUMMARY OF 1992 CONTROL DATA



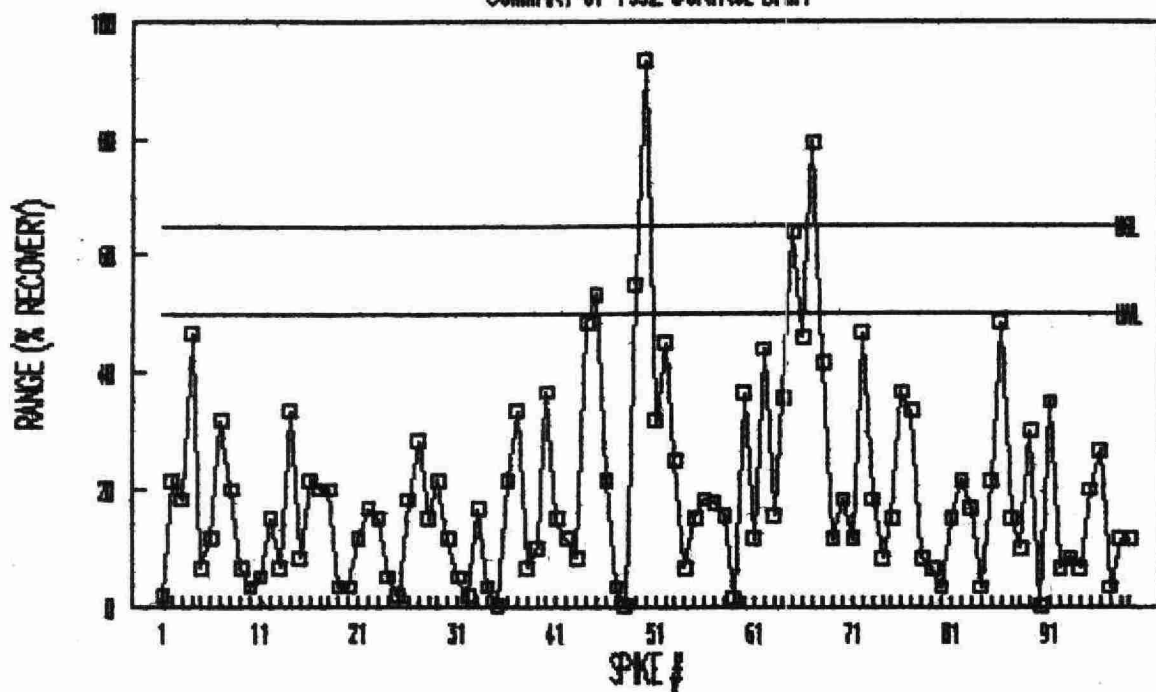
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SUMMARY OF 1992 CONTROL DATA



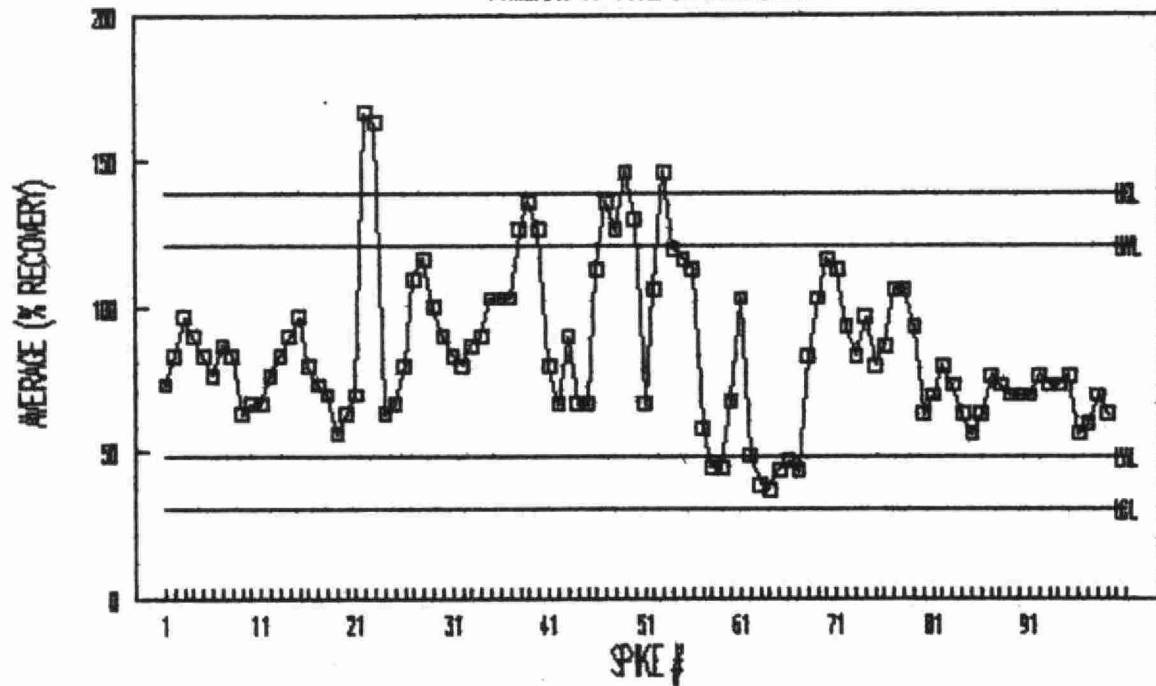
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SUMMARY OF 1992 CONTROL DATA



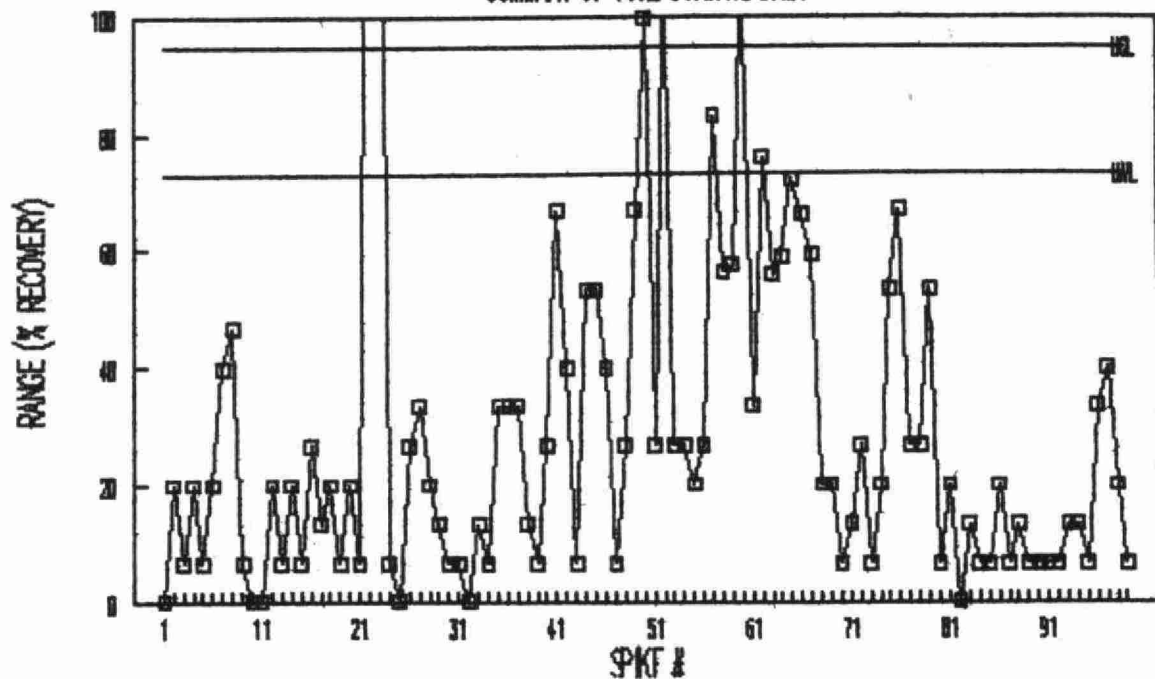
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SUMMARY OF 1992 CONTROL DATA



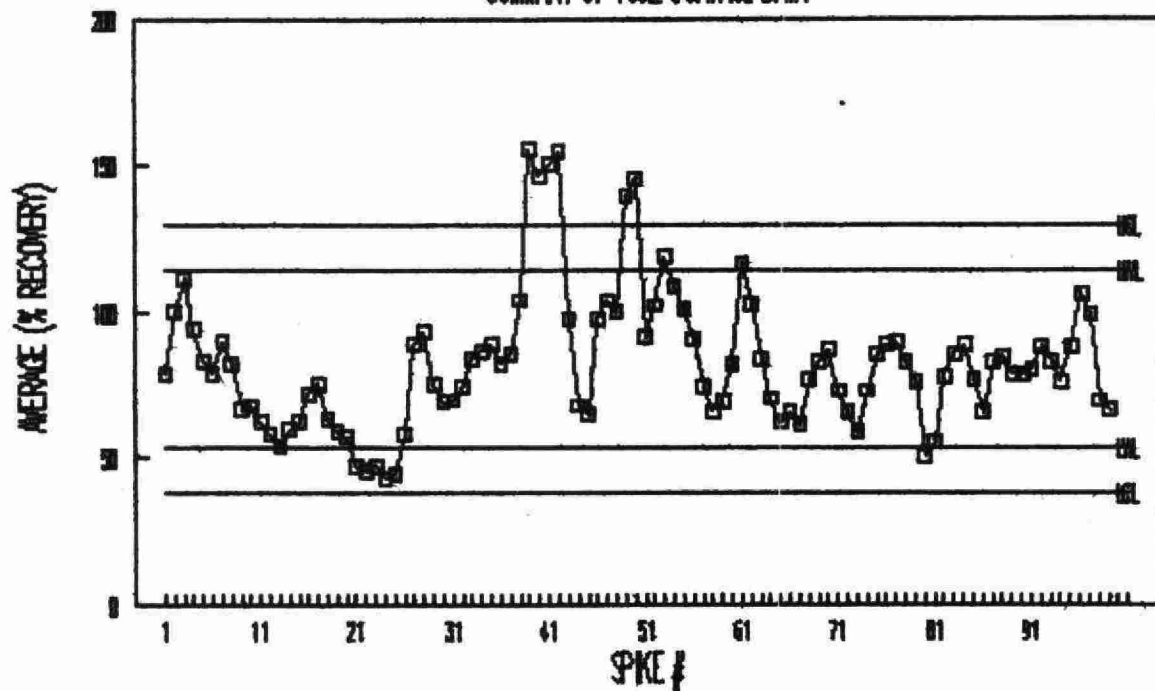
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SUMMARY OF 1992 CONTROL DATA



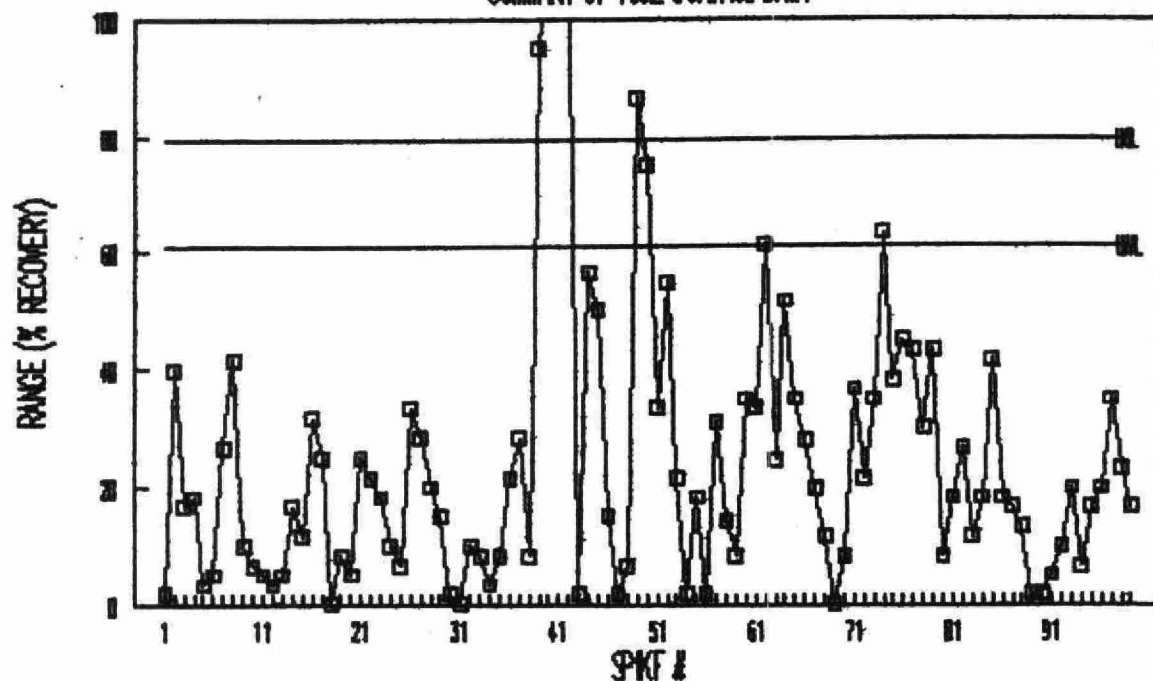
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SUMMARY OF 1992 CONTROL DATA



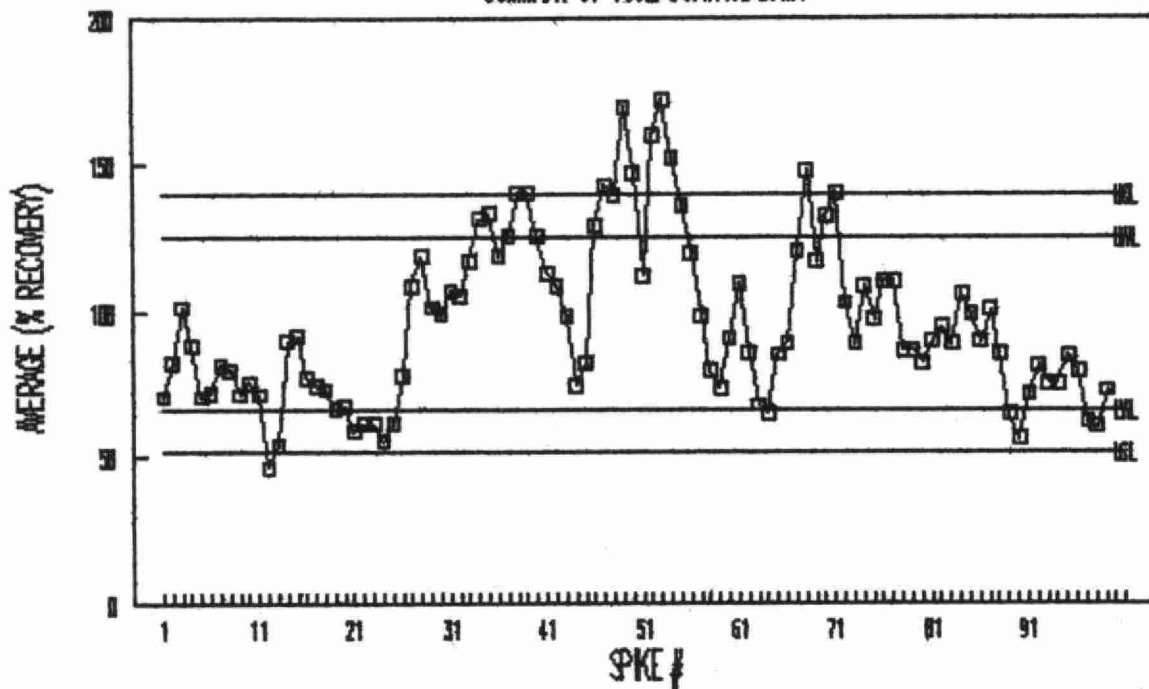
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SUMMARY OF 1992 CONTROL DATA



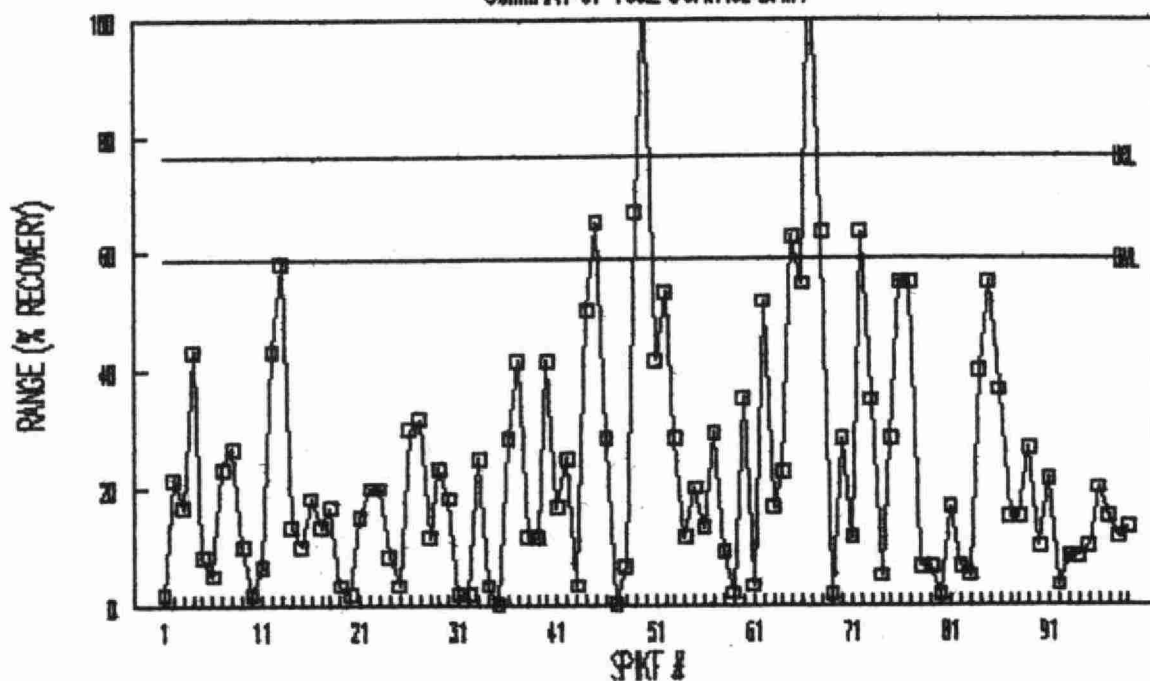
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SUMMARY OF 1992 CONTROL DATA



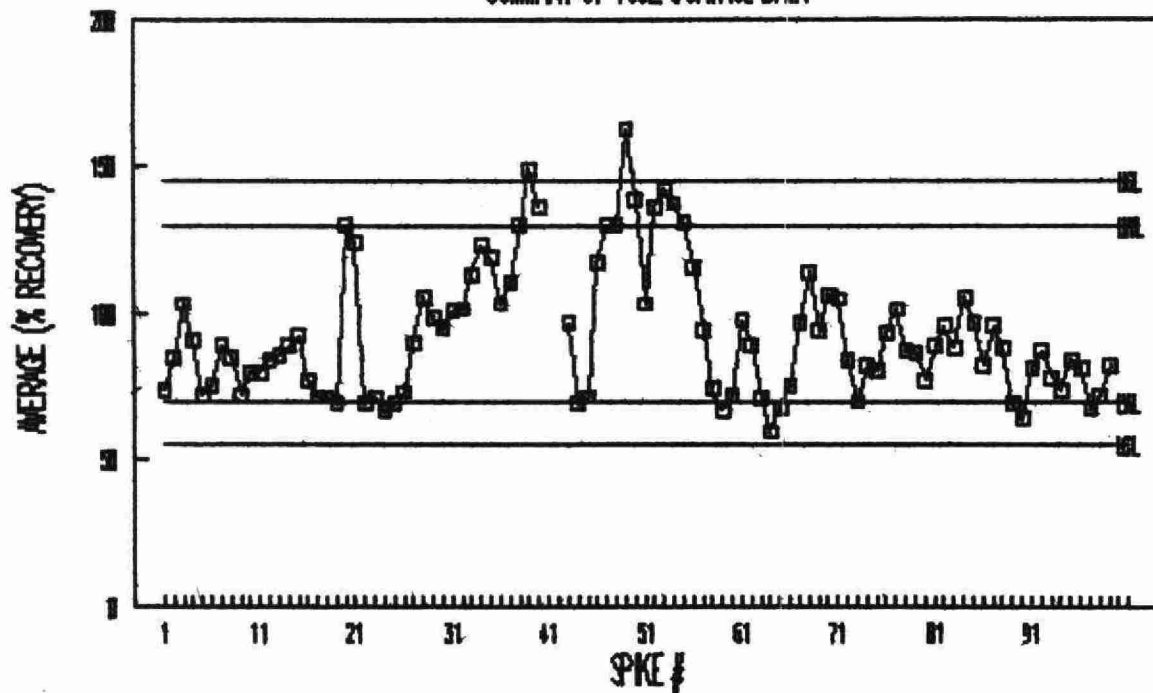
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SUMMARY OF 1992 CONTROL DATA



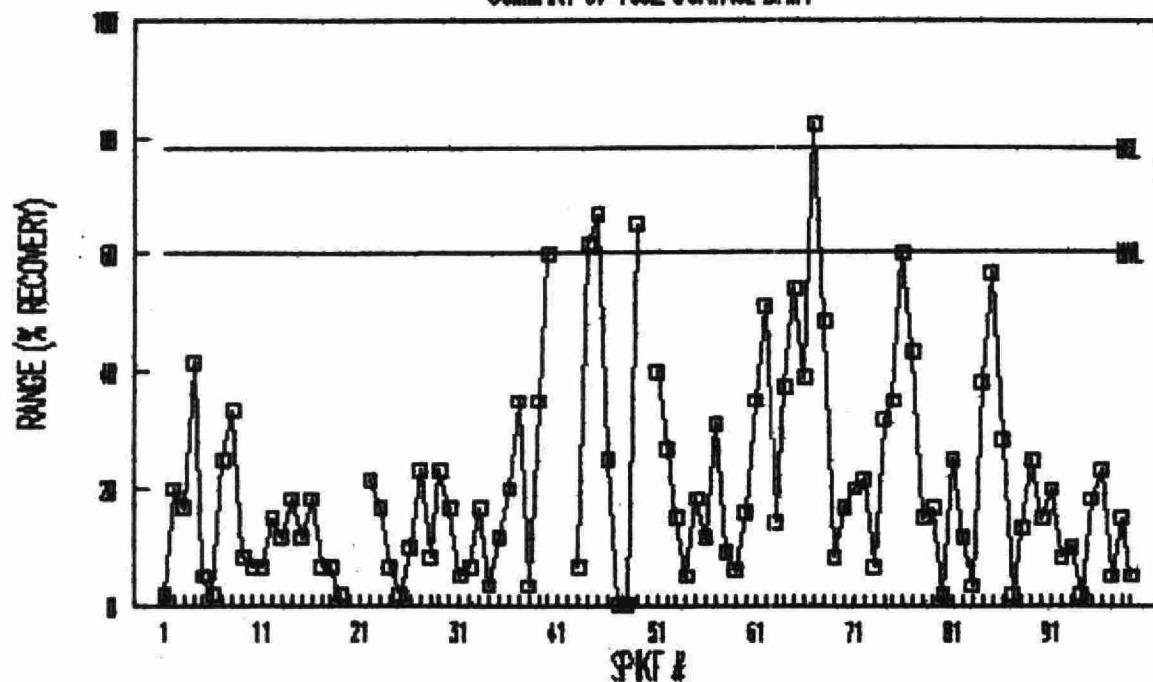
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SUMMARY OF 1992 CONTROL DATA



PWACB/OC: HEPT

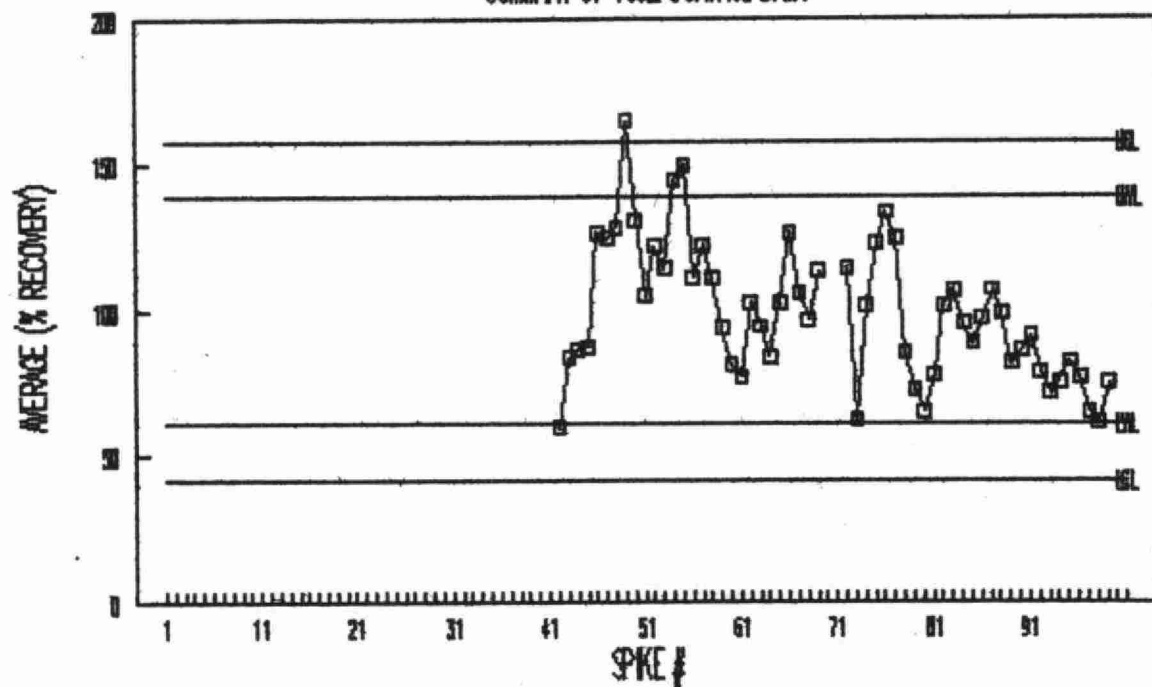
SUMMARY OF 1992 CONTROL DATA



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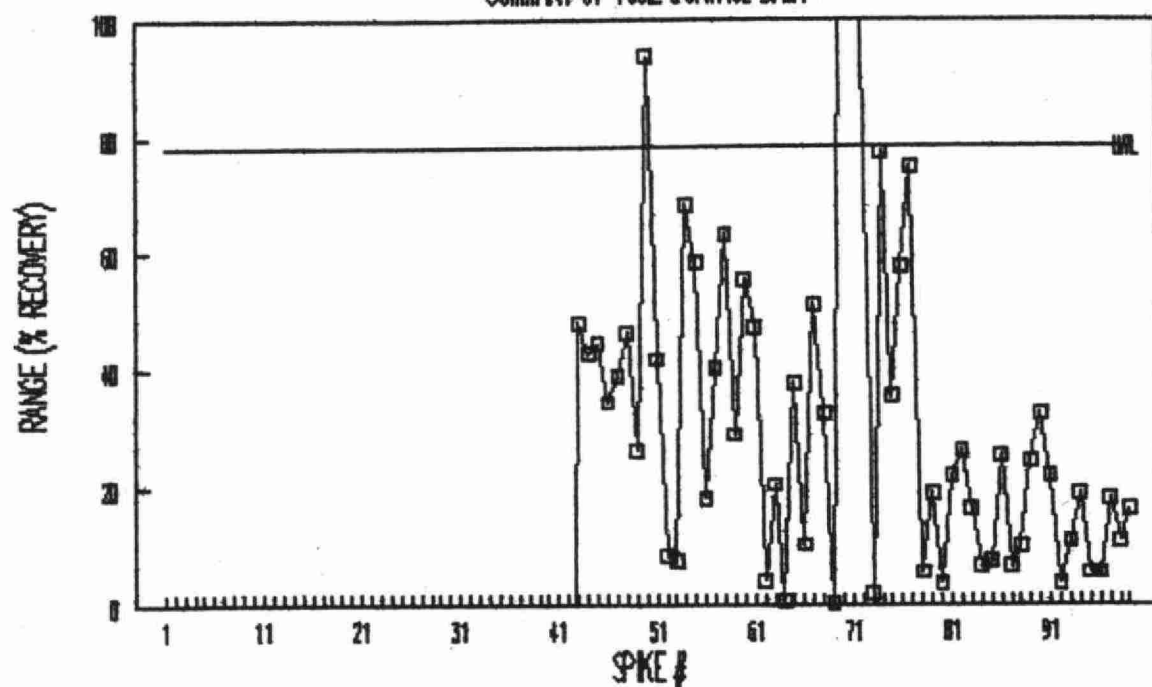
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SUMMARY OF 1992 CONTROL DATA



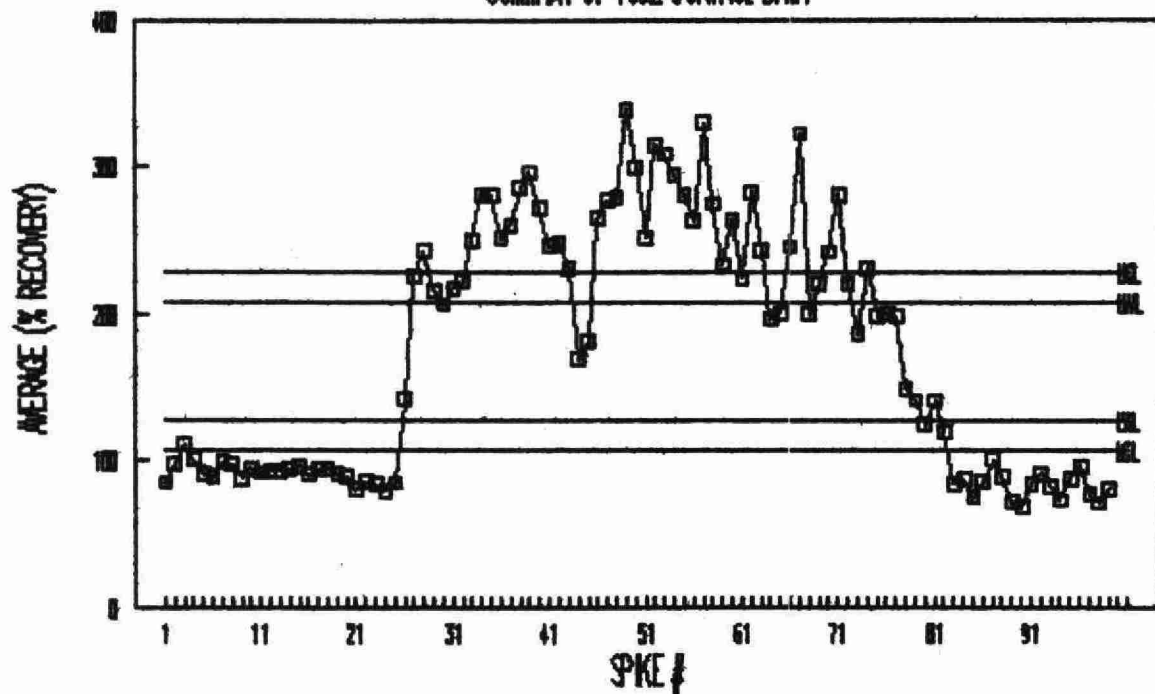
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SUMMARY OF 1992 CONTROL DATA



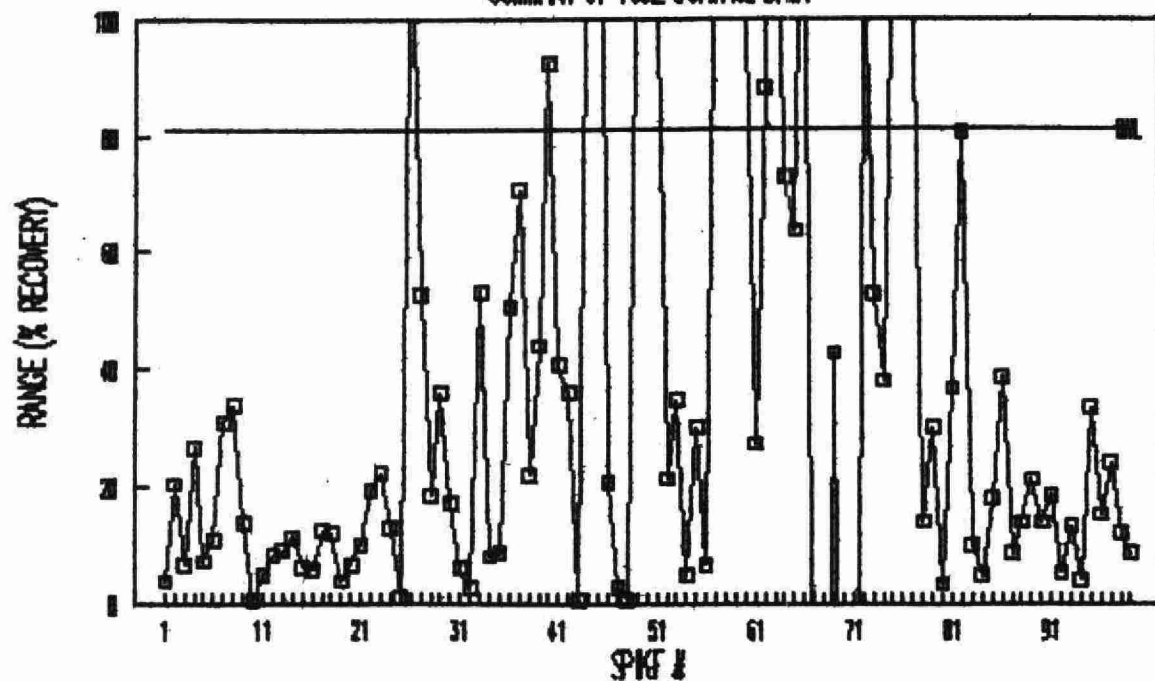
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SUMMARY OF 1992 CONTROL DATA



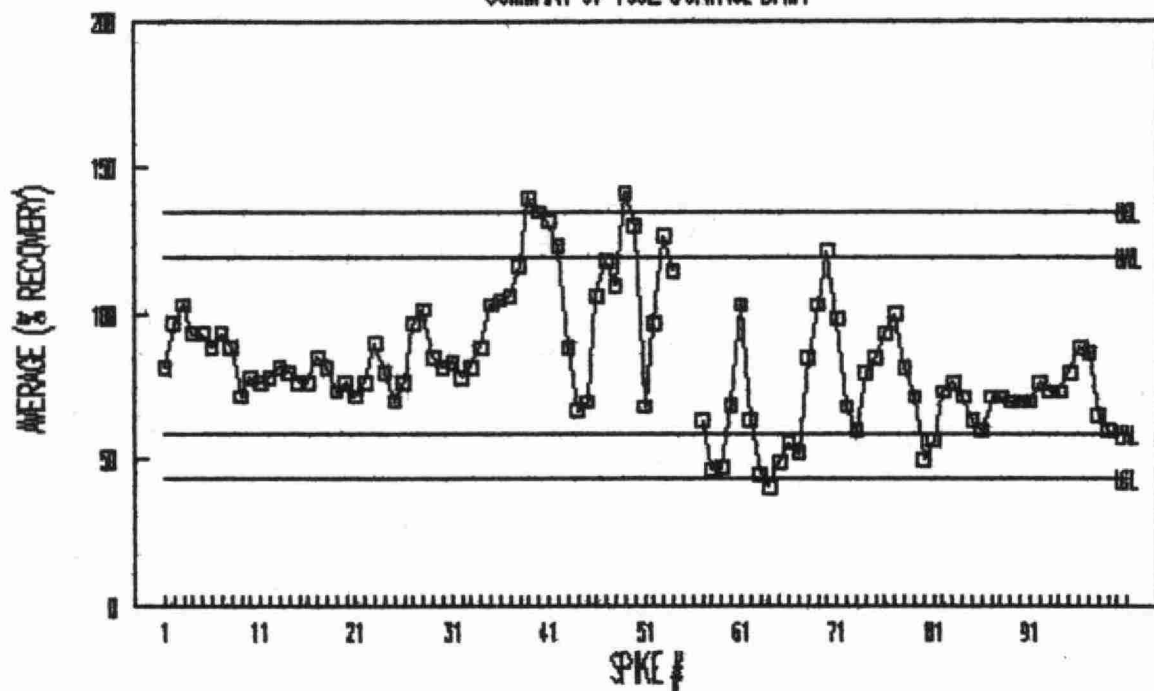
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SUMMARY OF 1992 CONTROL DATA



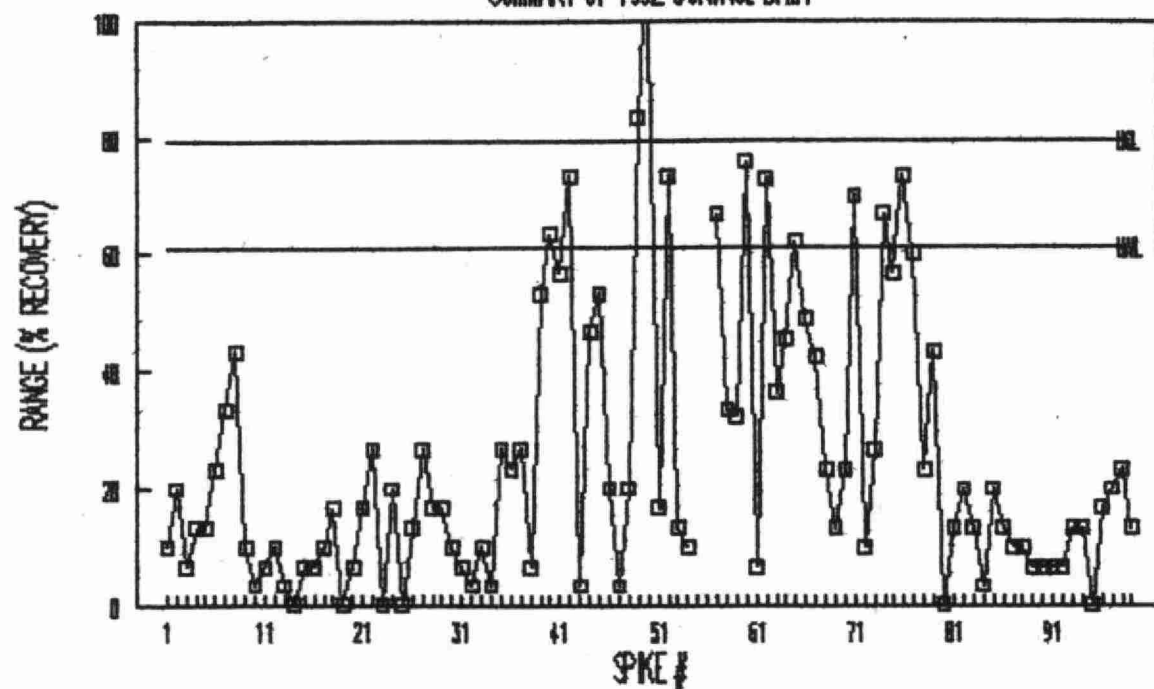
PWACB/OC: OCTSTR

SUMMARY OF 1992 CONTROL DATA



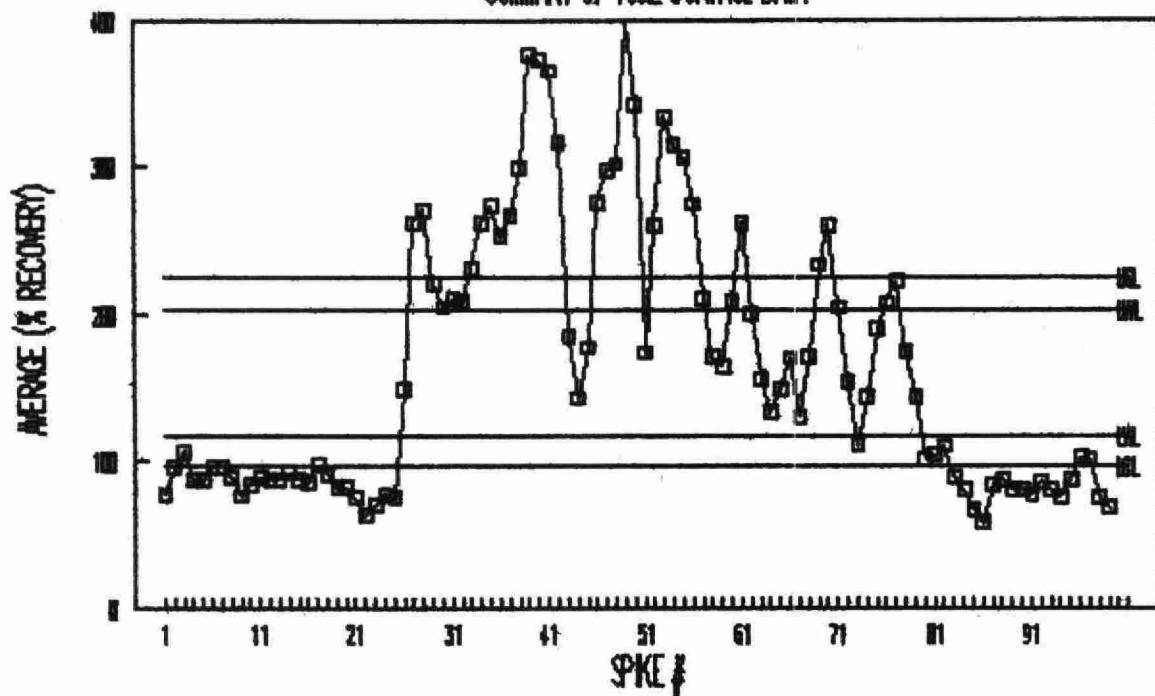
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SUMMARY OF 1992 CONTROL DATA



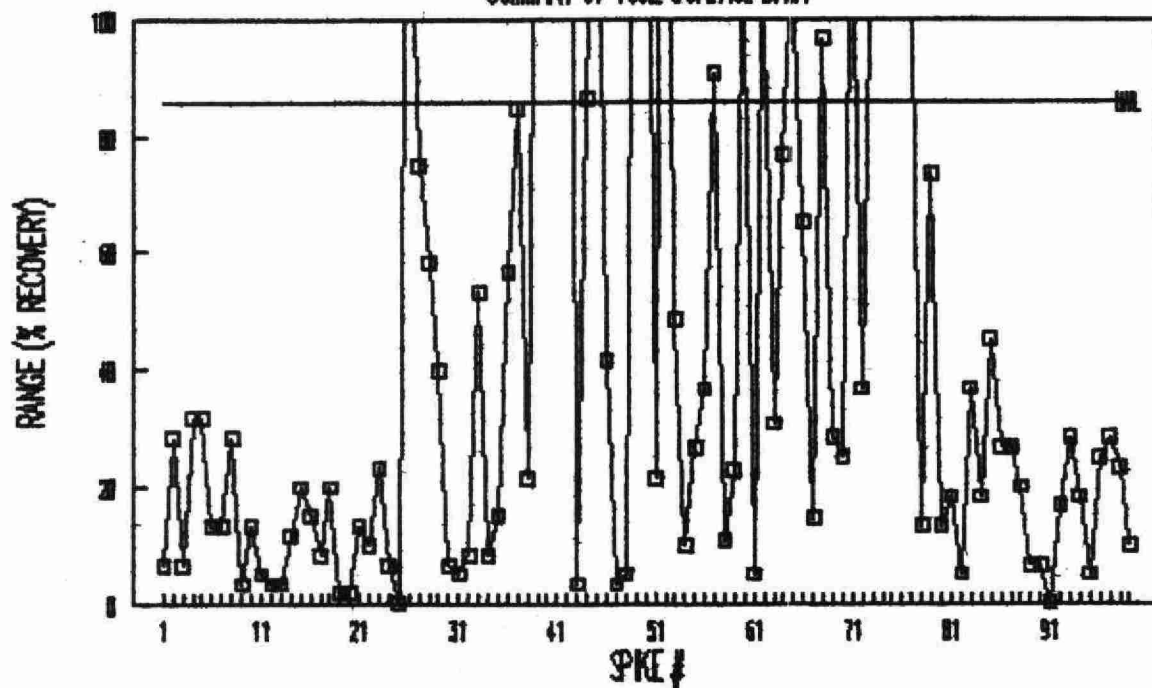
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SUMMARY OF 1992 CONTROL DATA



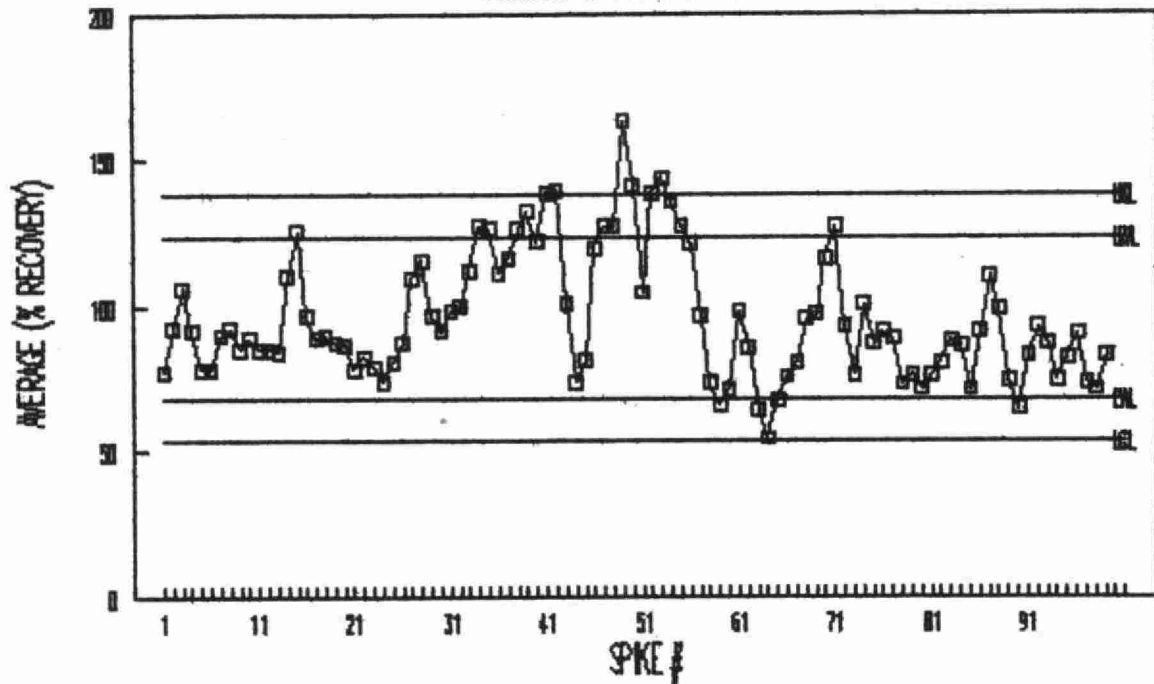
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SUMMARY OF 1992 CONTROL DATA



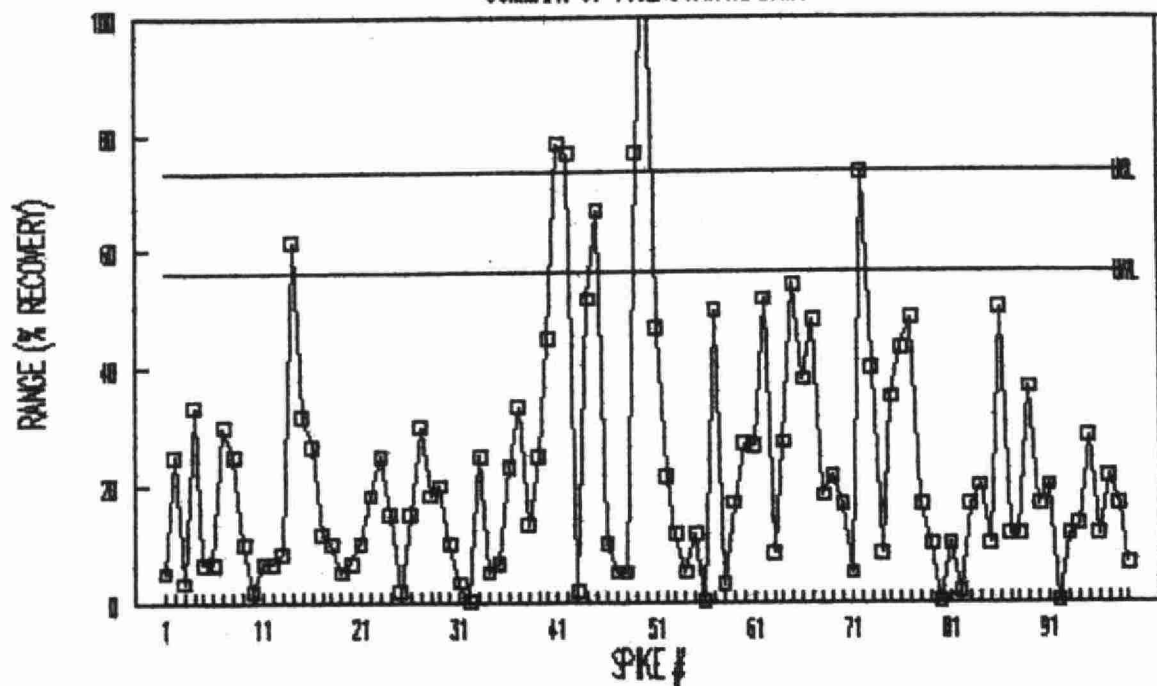
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SUMMARY OF 1992 CONTROL DATA



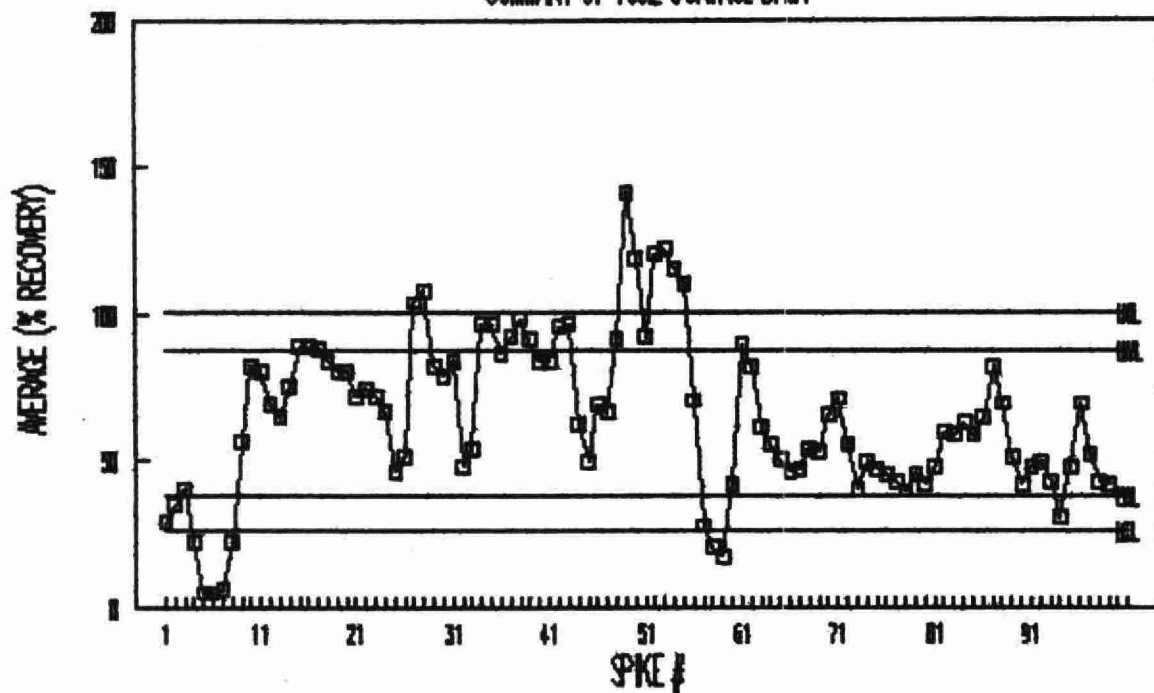
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SUMMARY OF 1992 CONTROL DATA



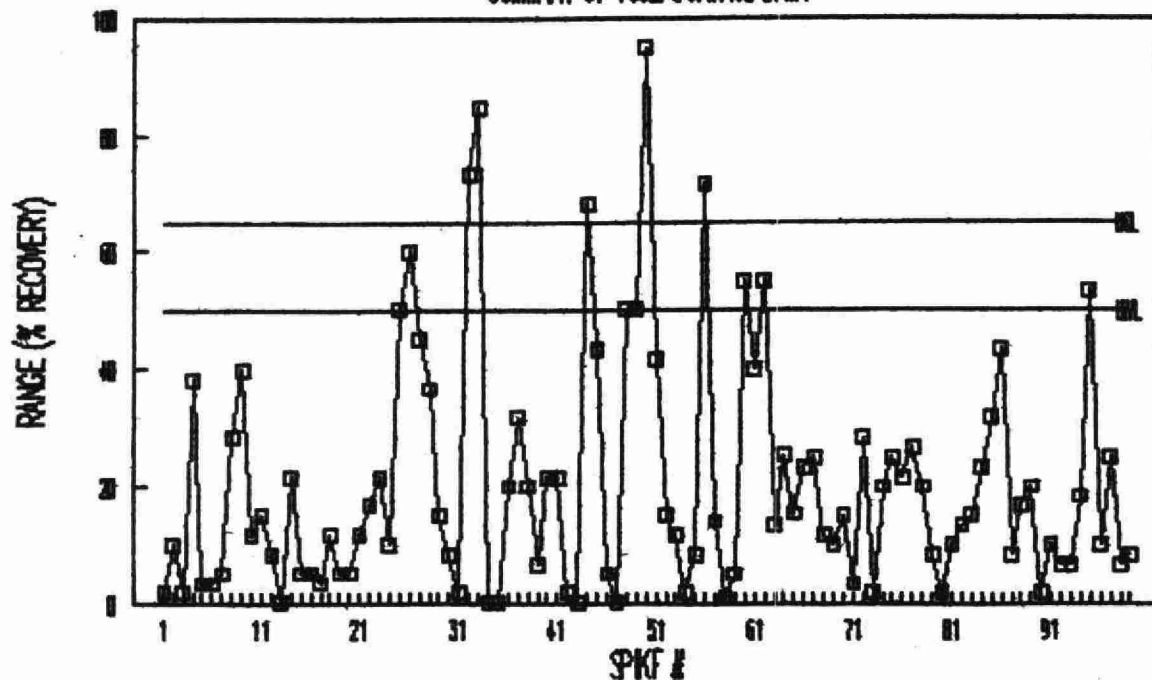
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SUMMARY OF 1992 CONTROL DATA



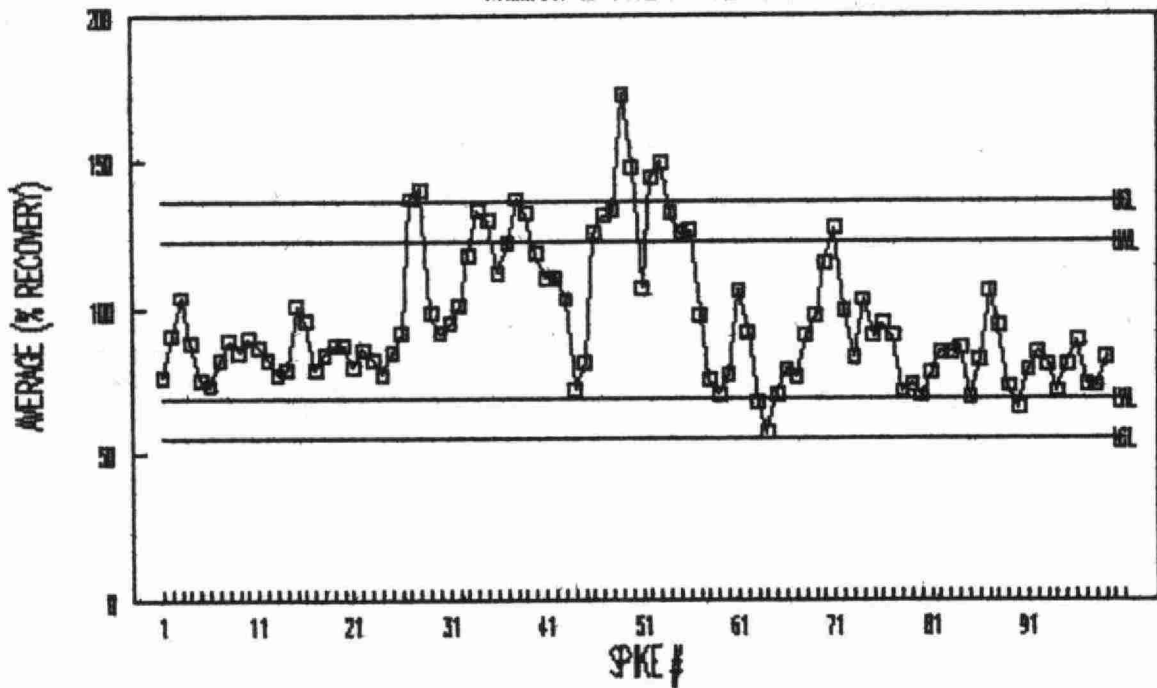
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SUMMARY OF 1992 CONTROL DATA



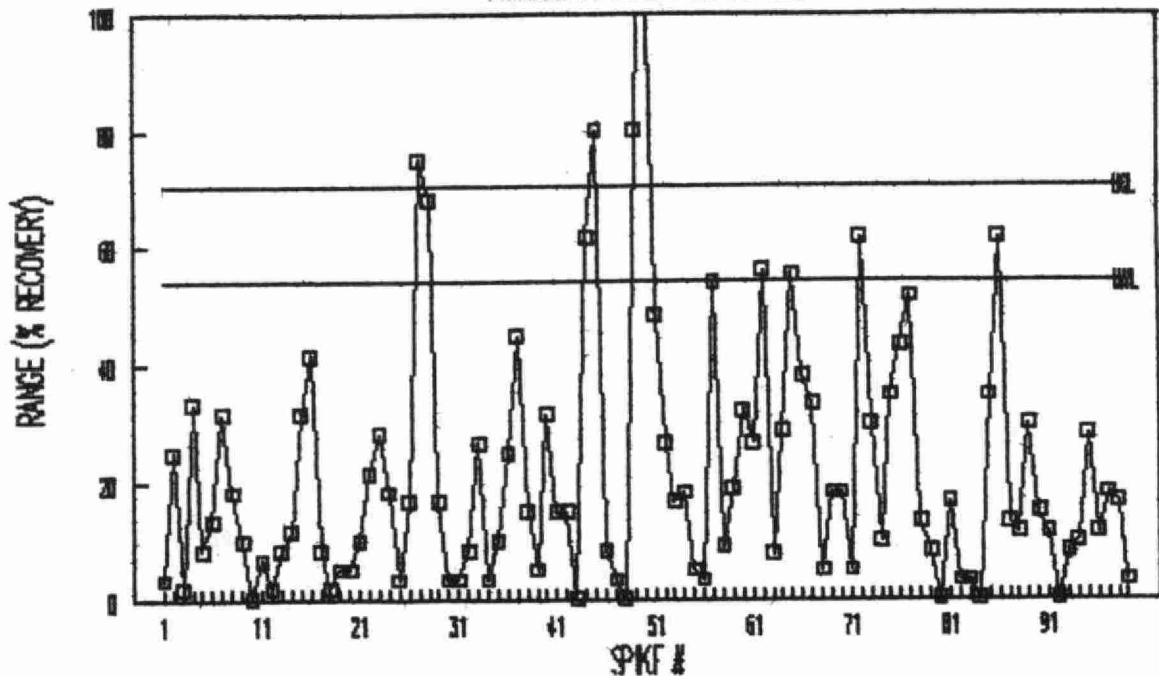
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SUMMARY OF 1992 CONTROL DATA



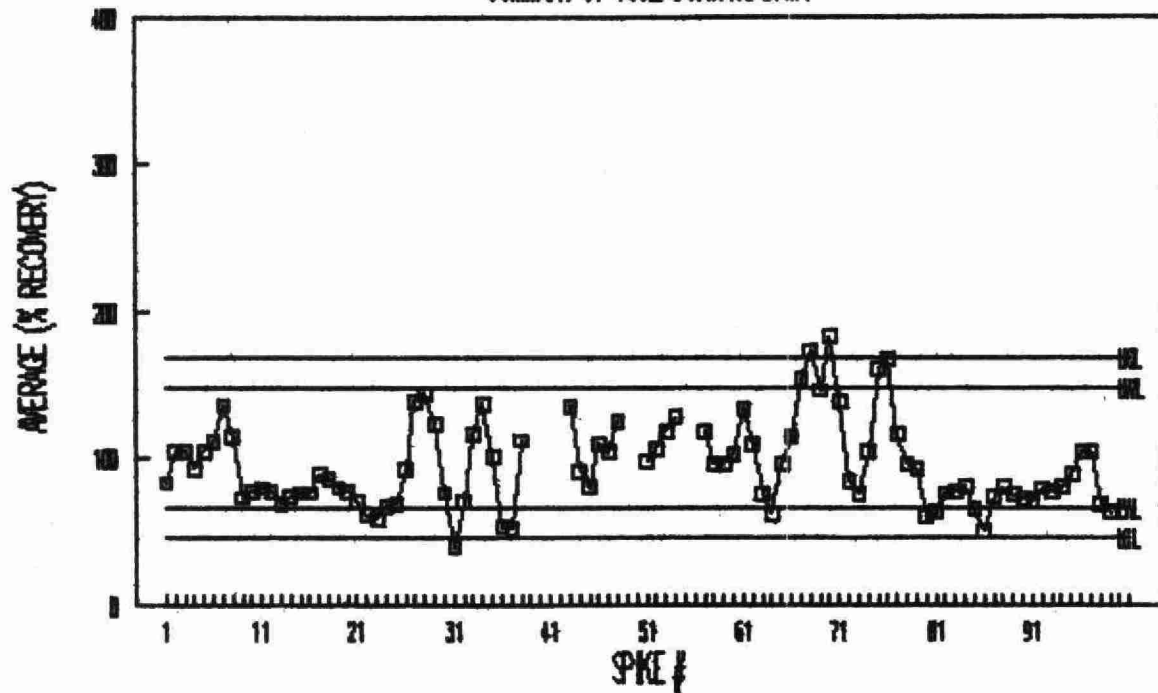
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SUMMARY OF 1992 CONTROL DATA



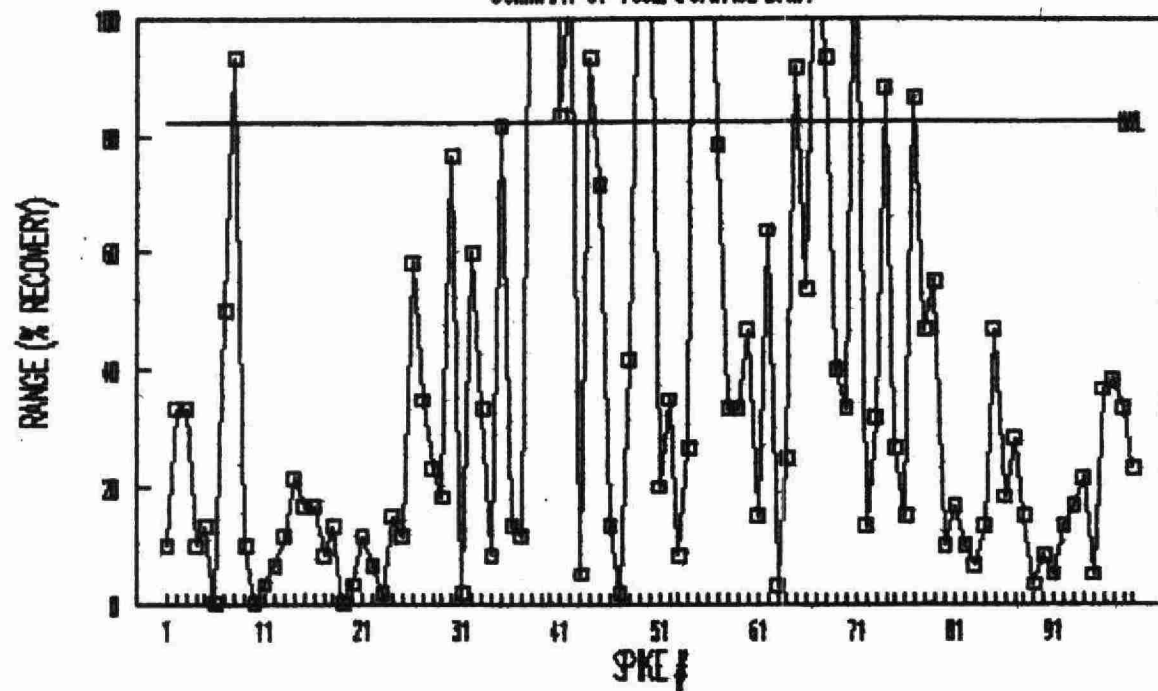
PWACB/OC: DDE

SUMMARY OF 1992 CONTROL DATA



PWACB/OC: DDE

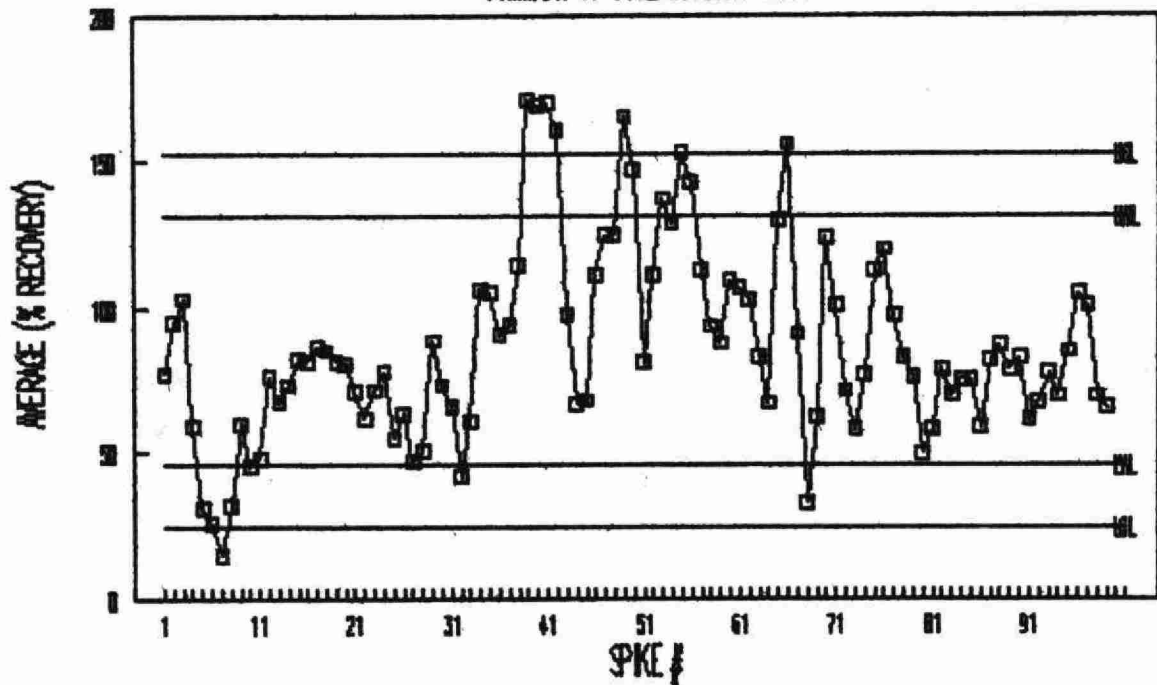
SUMMARY OF 1992 CONTROL DATA



26

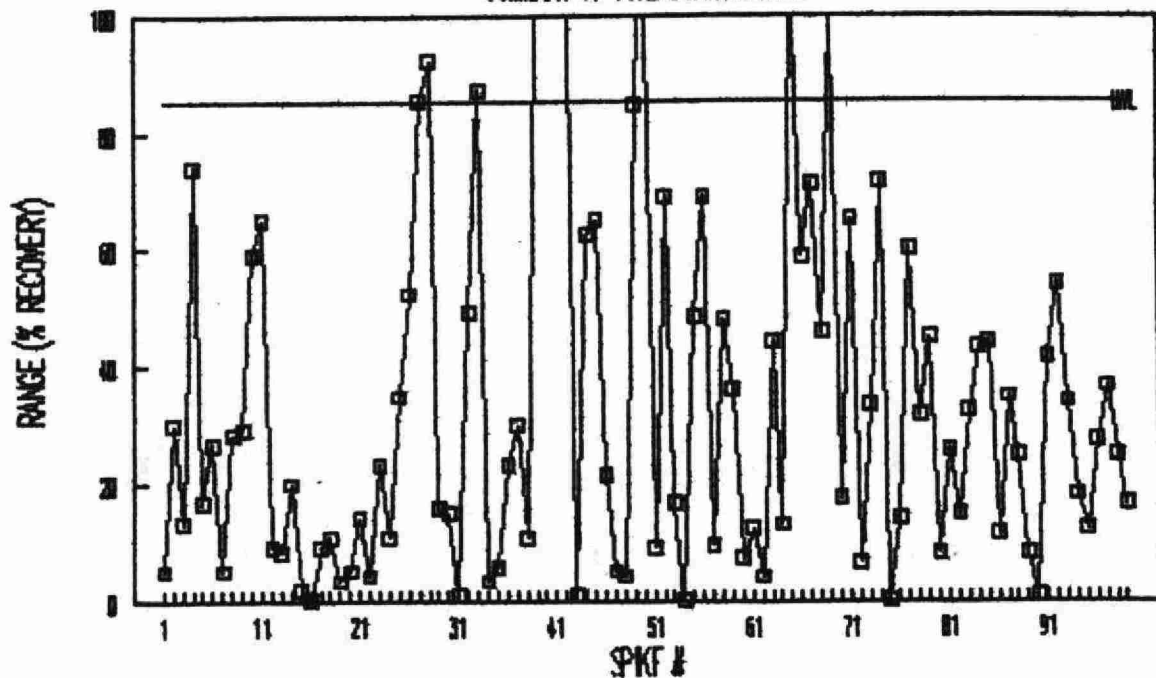
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SUMMARY OF 1992 CONTROL DATA



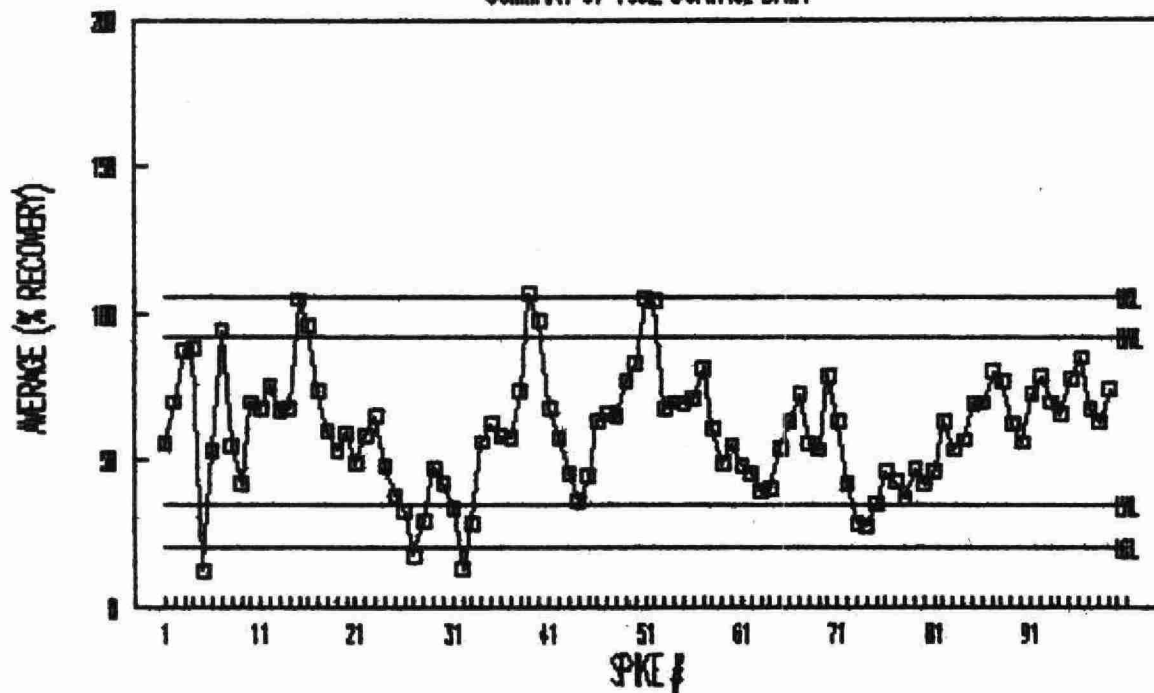
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SUMMARY OF 1992 CONTROL DATA



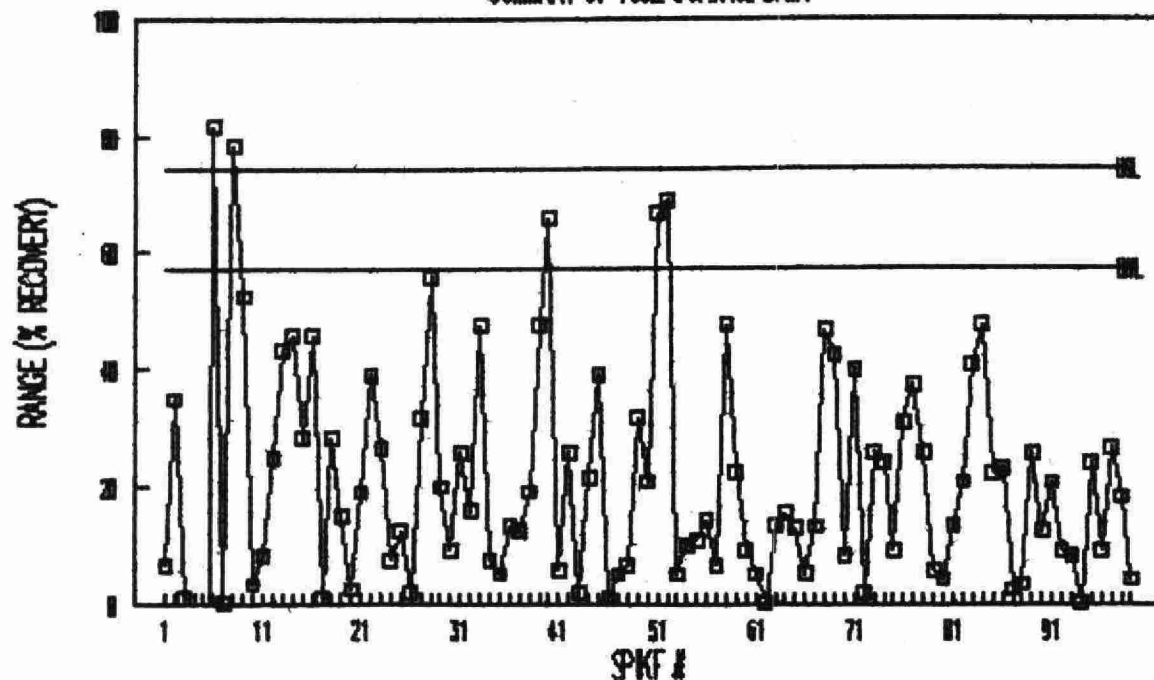
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SUMMARY OF 1992 CONTROL DATA



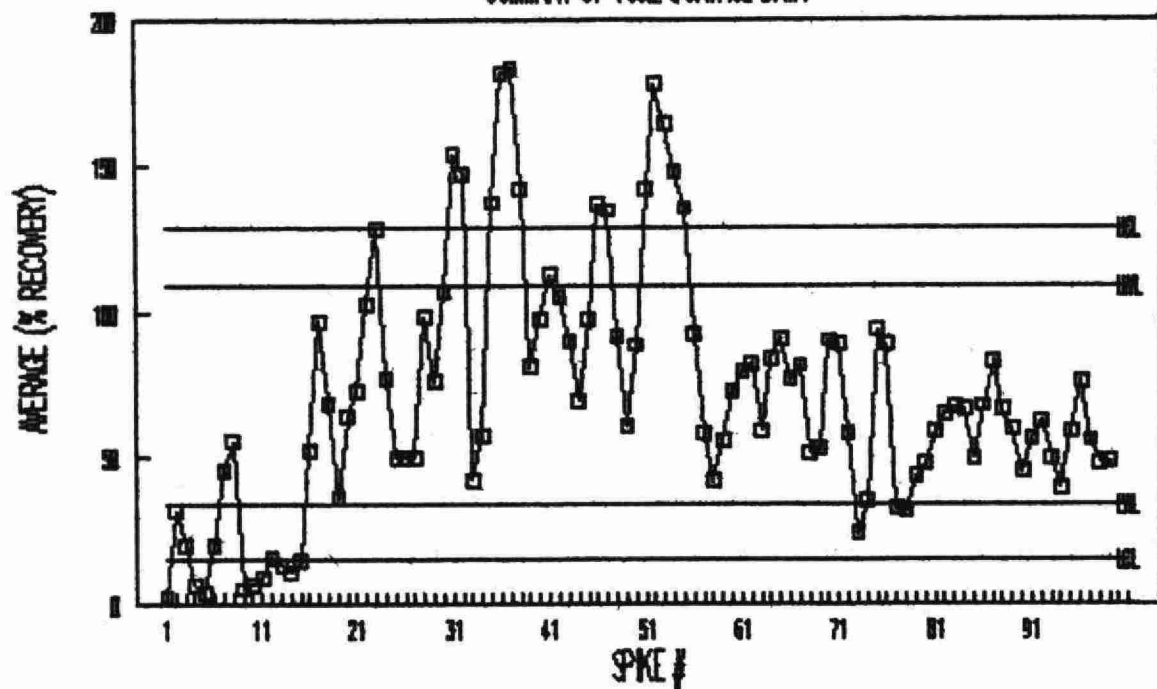
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SUMMARY OF 1992 CONTROL DATA



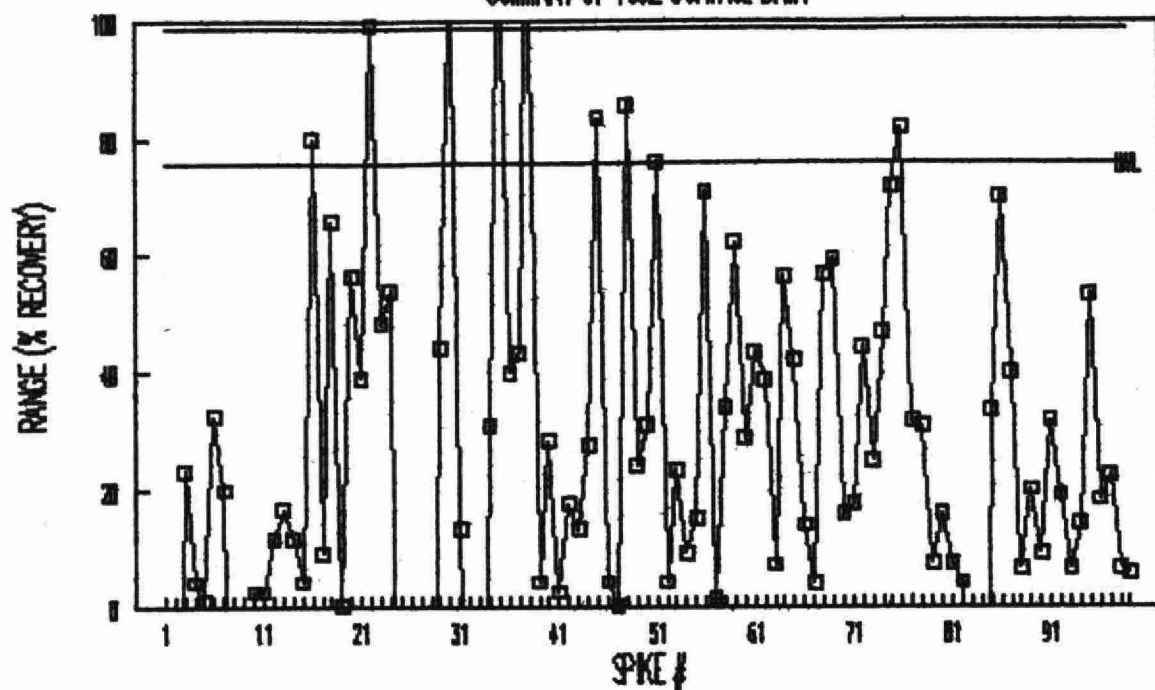
PWACB/OC: ENDOS2

SUMMARY OF 1992 CONTROL DATA



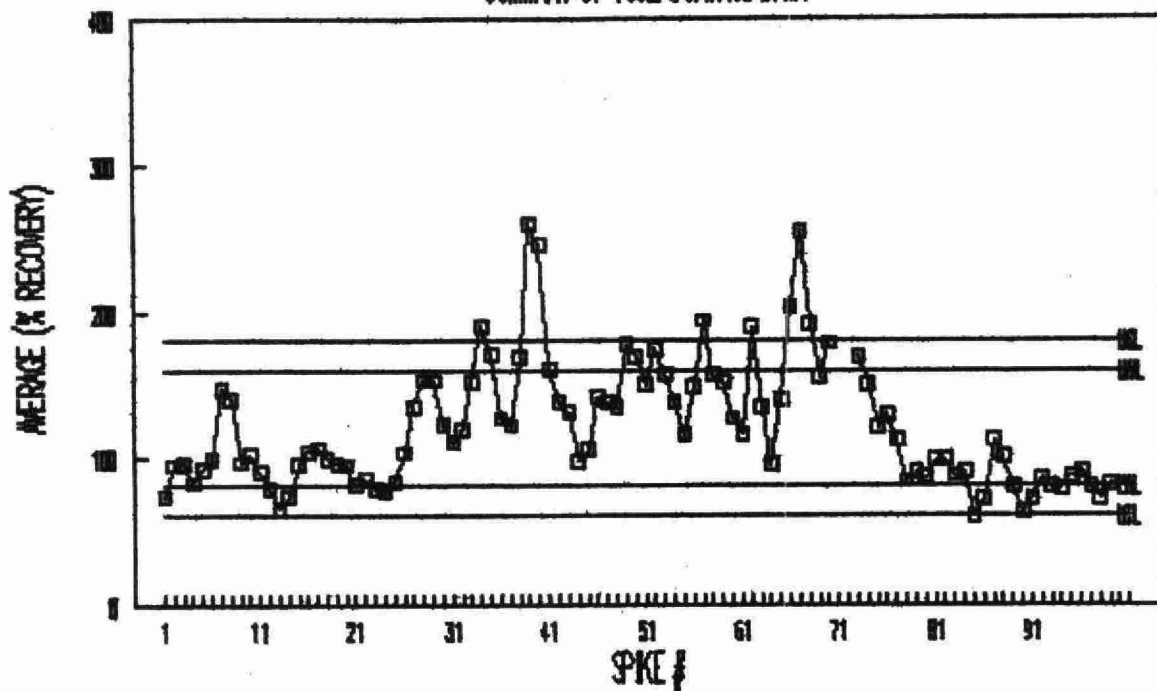
PWACB/OC: ENDOS2

SUMMARY OF 1992 CONTROL DATA



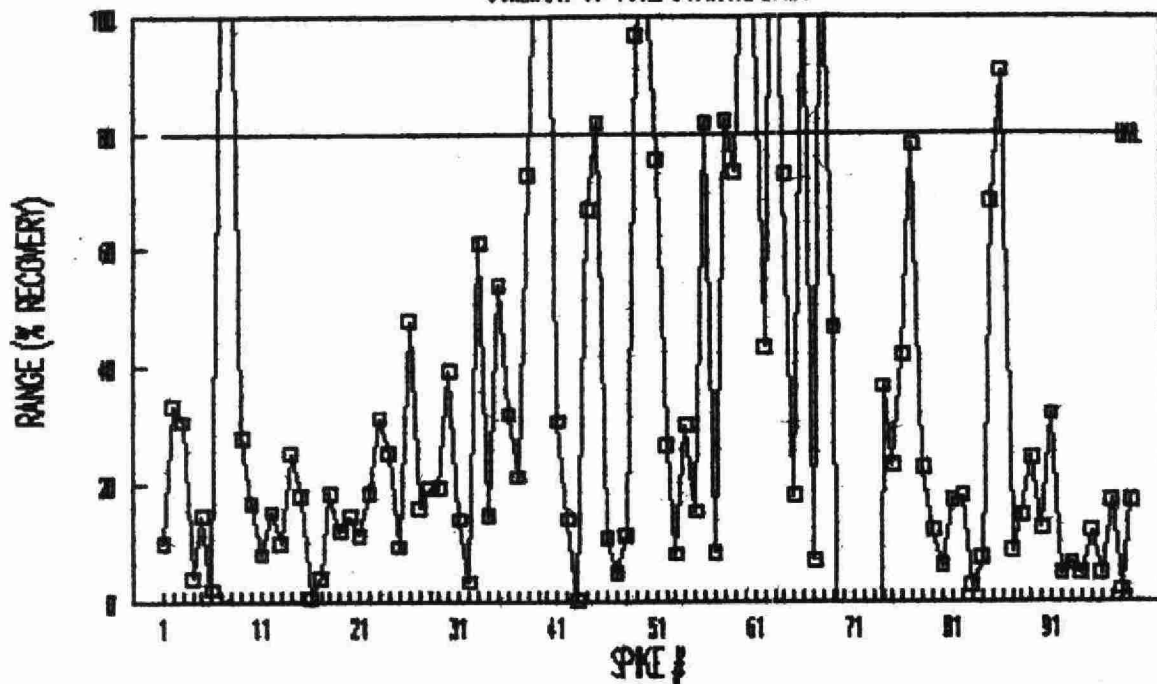
PWACB/OC: PPDDD

SUMMARY OF 1992 CONTROL DATA



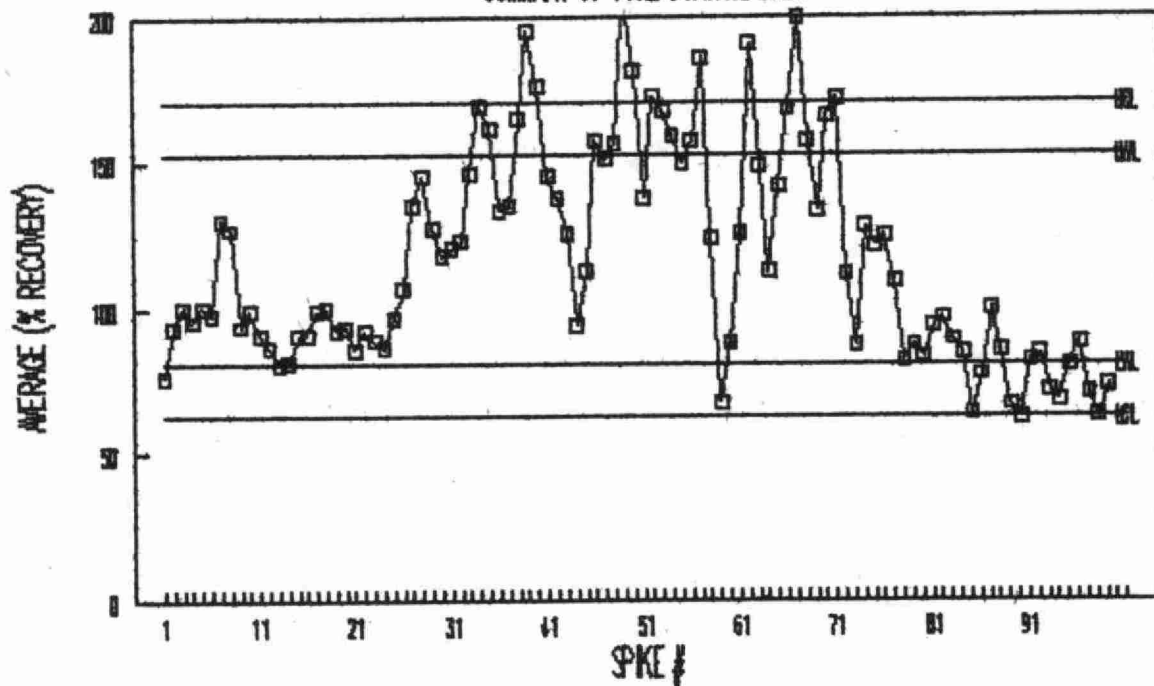
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SUMMARY OF 1992 CONTROL DATA



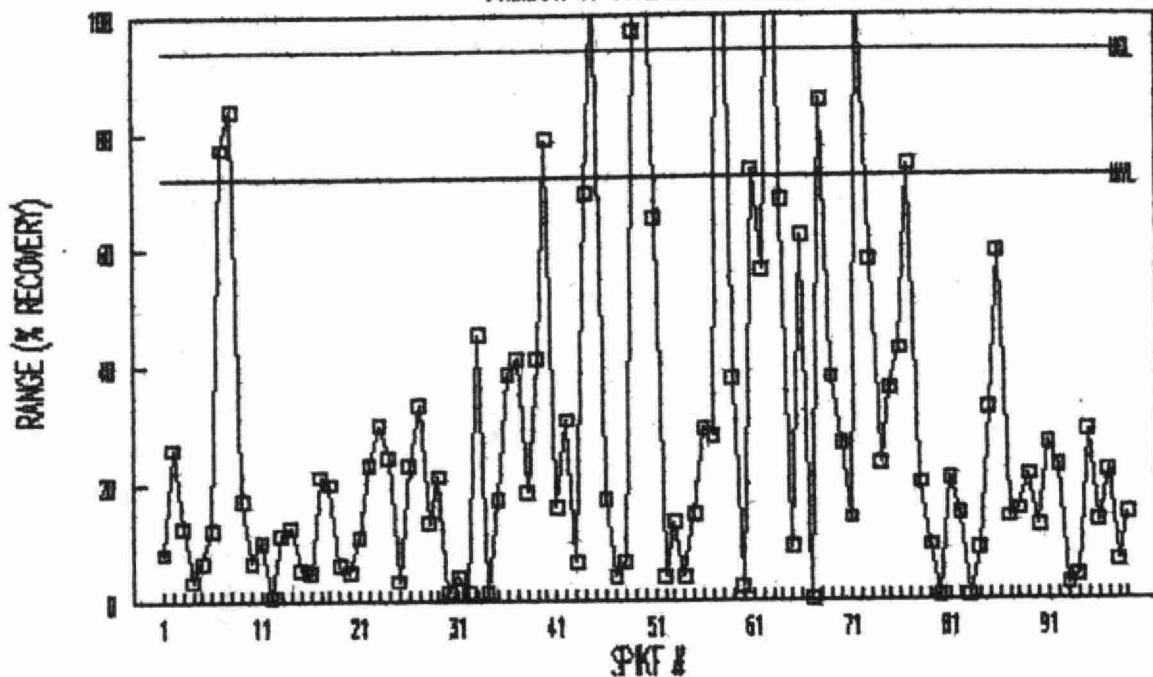
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SUMMARY OF 1992 CONTROL DATA



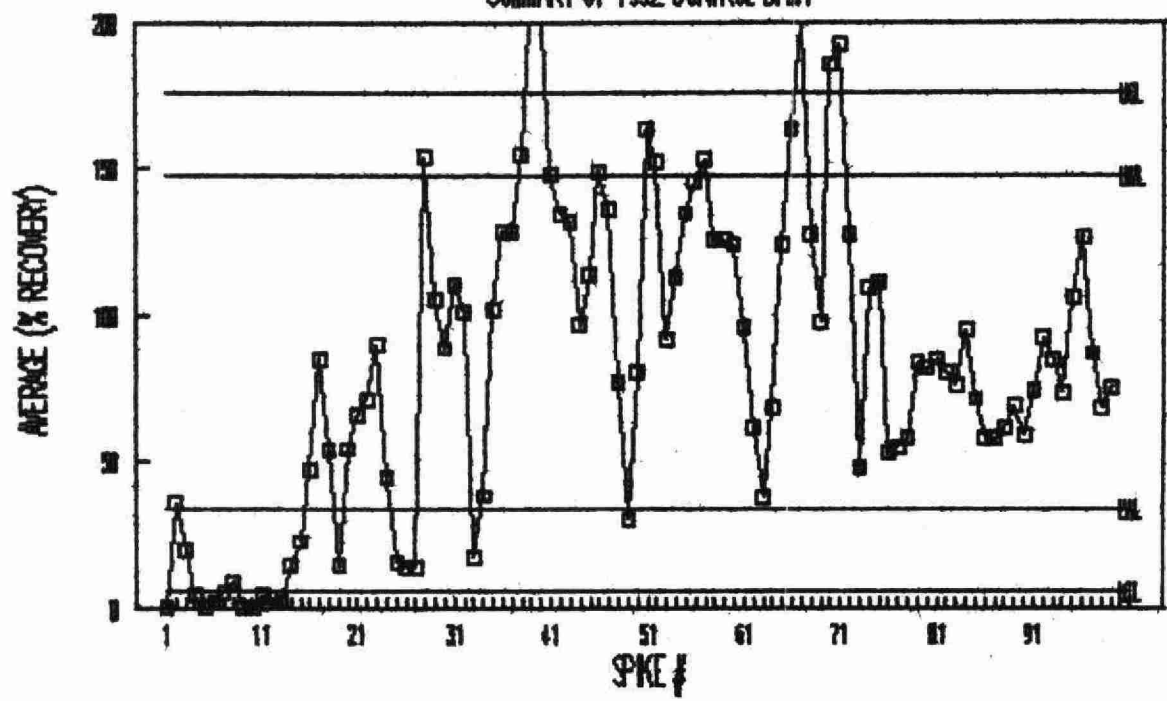
PWACB/OC: OPDDT

SUMMARY OF 1992 CONTROL DATA



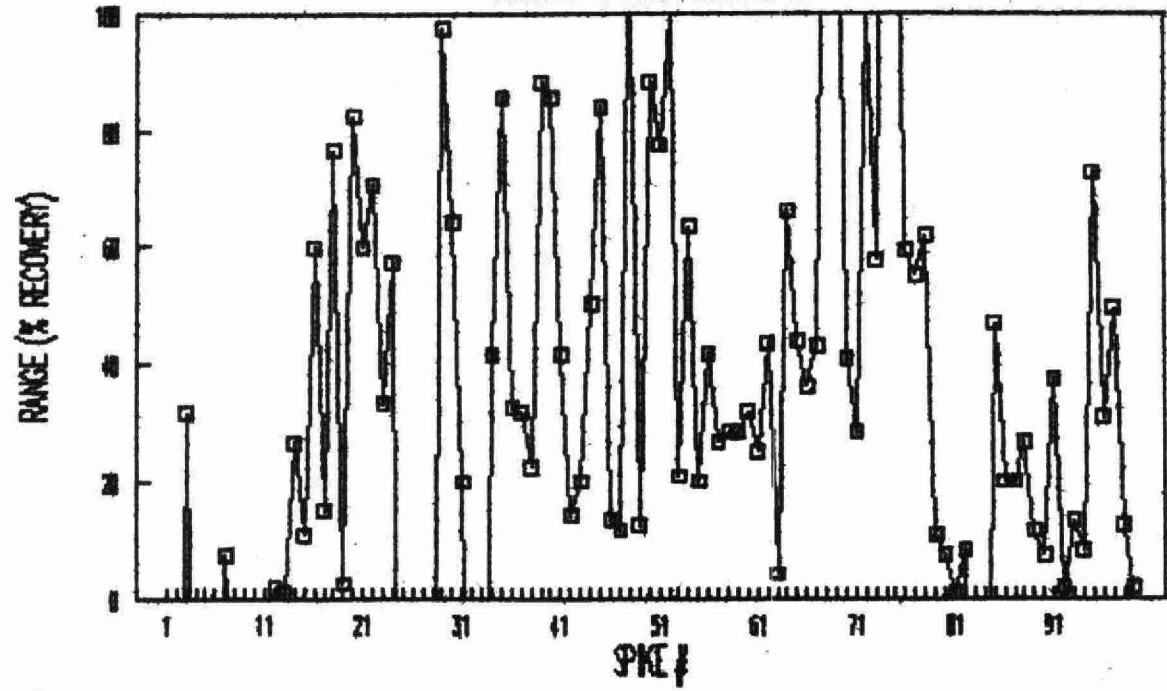
PWACB/OC: ENDOSS

SUMMARY OF 1992 CONTROL DATA



PWACB/OC: ENDOSS

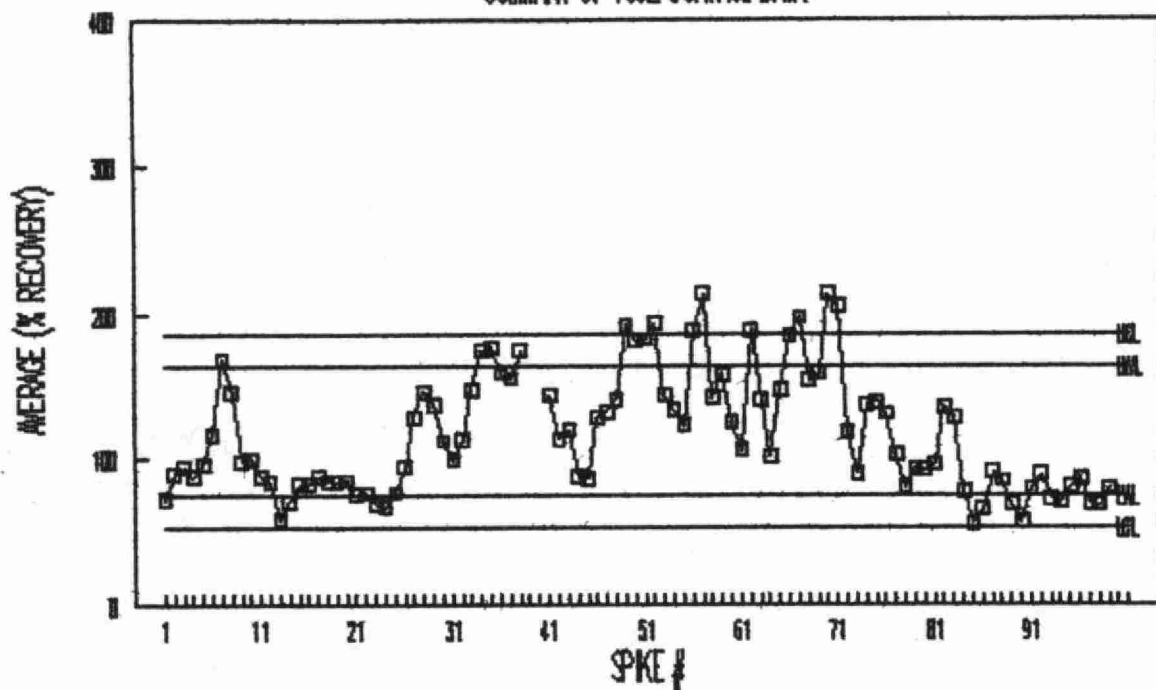
SUMMARY OF 1992 CONTROL DATA



2.

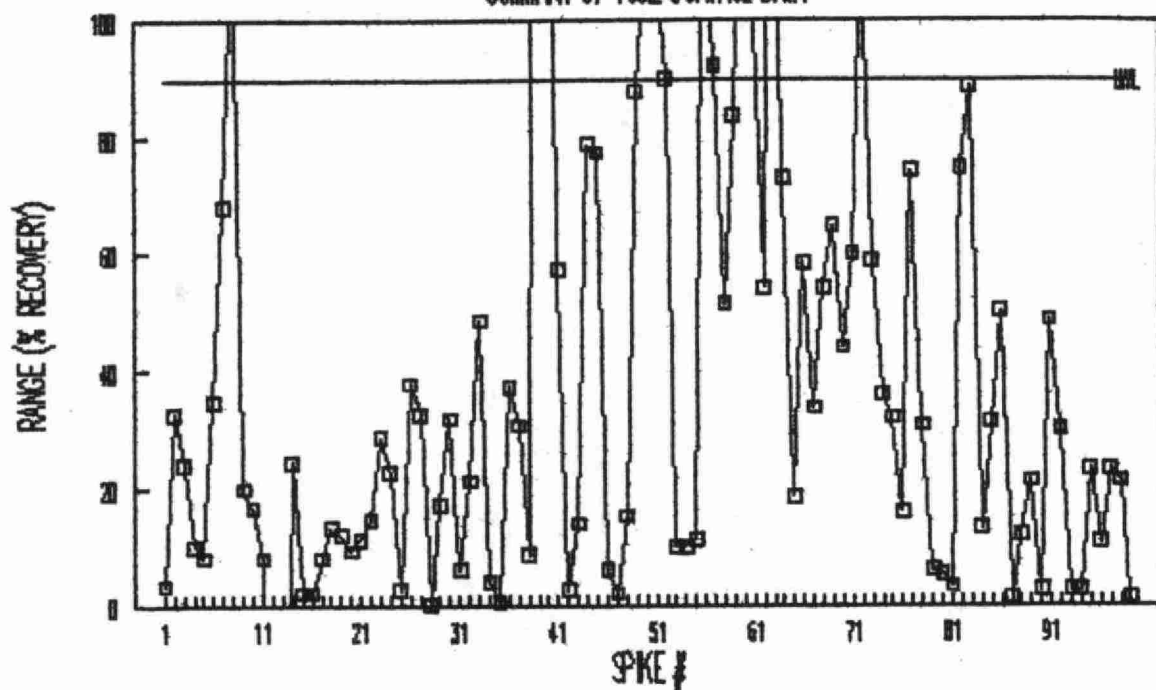
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SUMMARY OF 1992 CONTROL DATA



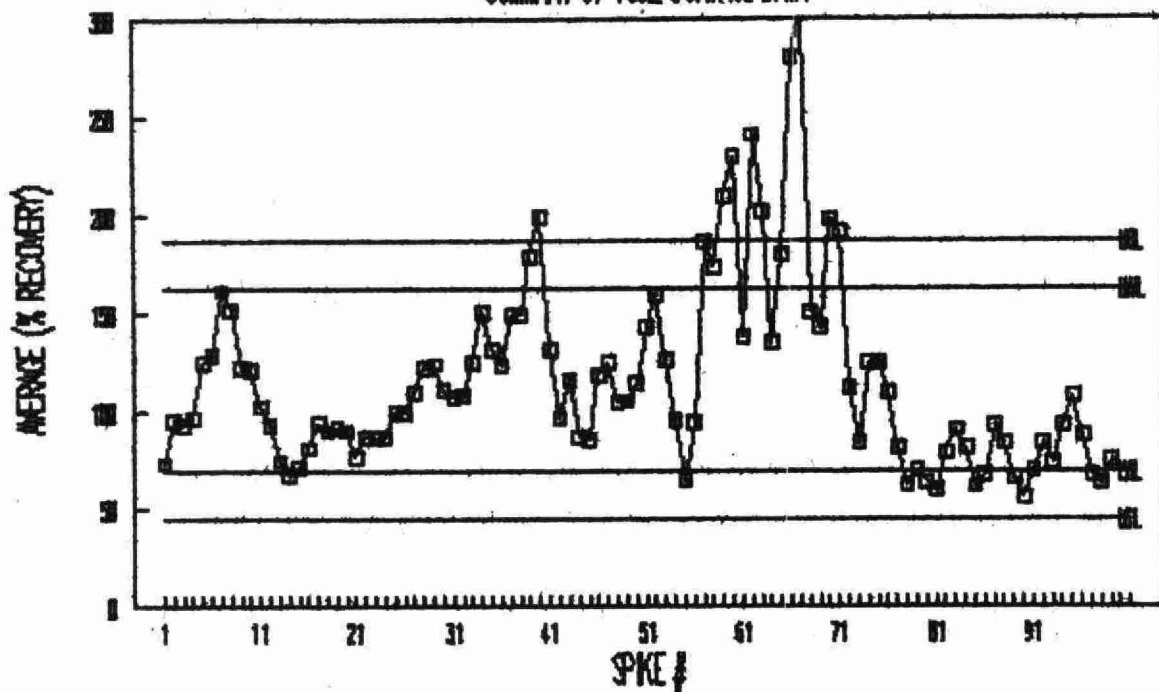
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SUMMARY OF 1992 CONTROL DATA



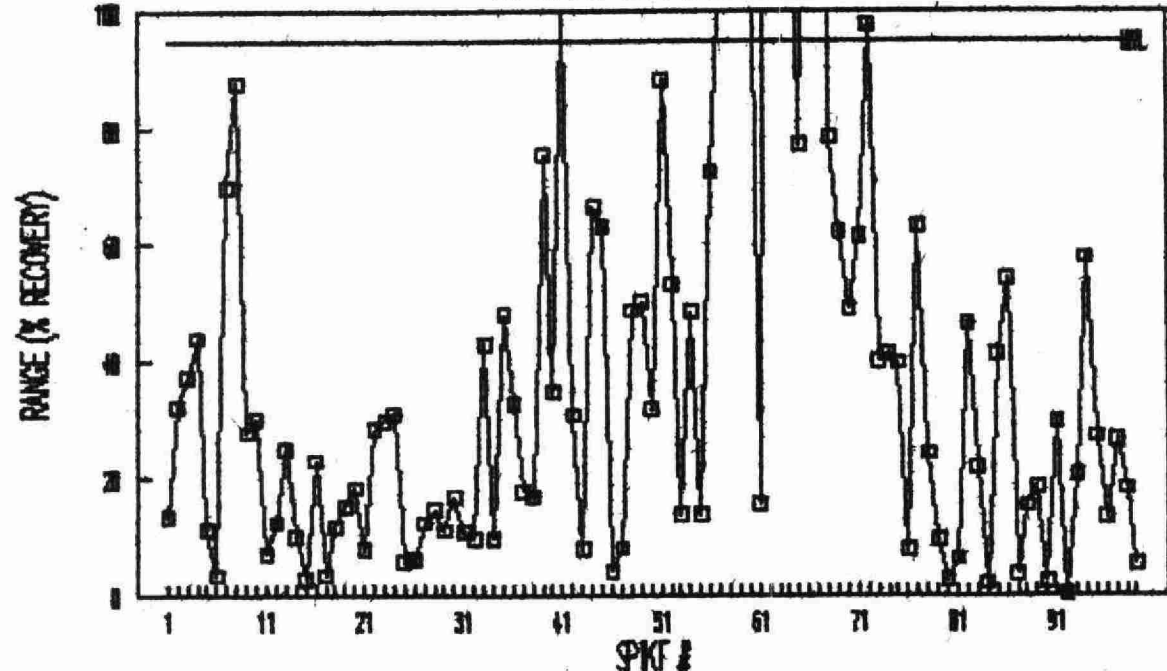
PWACB/OC: DMDT

SUMMARY OF 1992 CONTROL DATA



PWACB/OC: DMDT

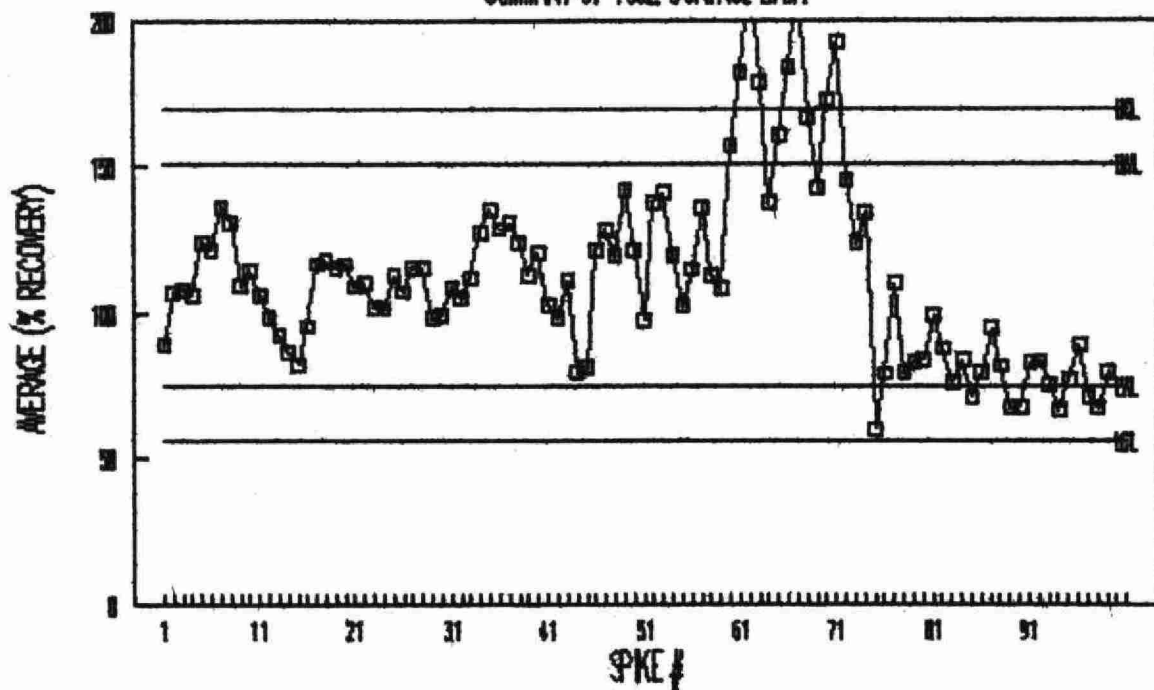
SUMMARY OF 1992 CONTROL DATA



34

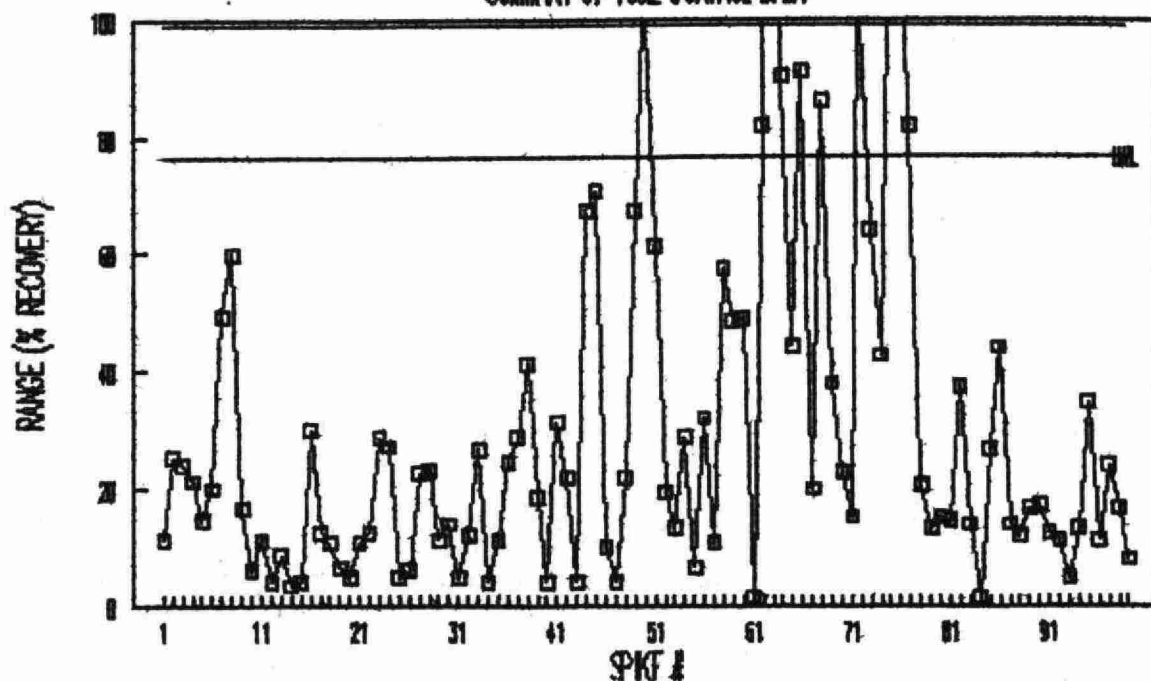
PWACB/OC: MIREX

SUMMARY OF 1992 CONTROL DATA



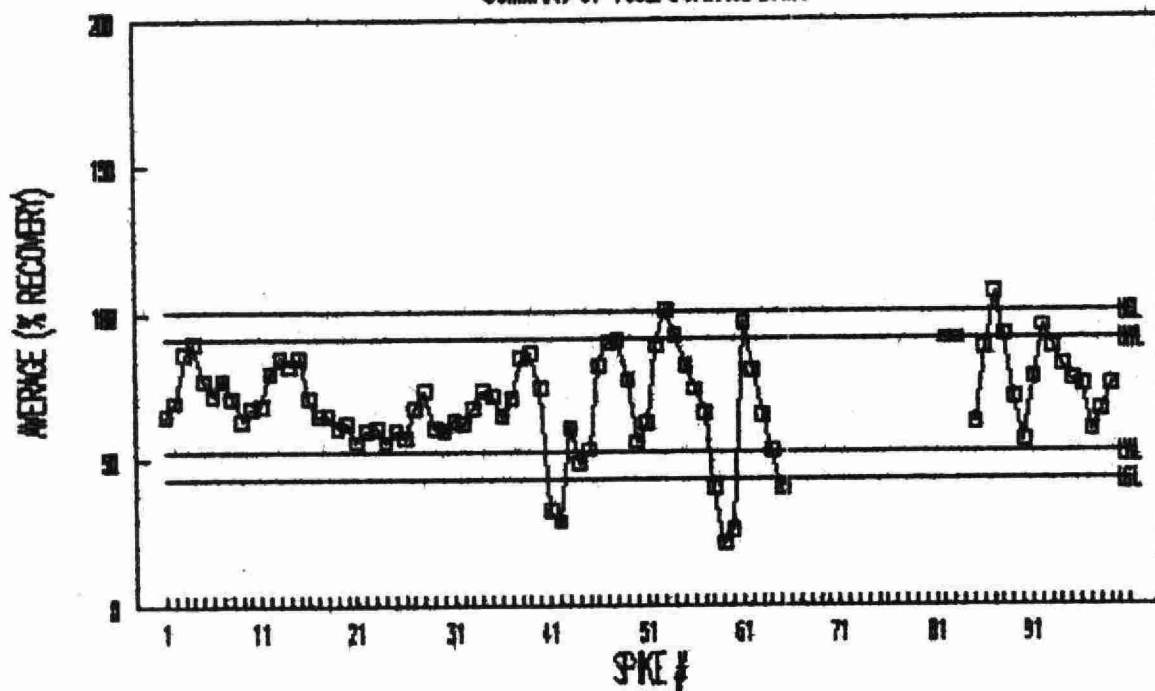
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SUMMARY OF 1992 CONTROL DATA



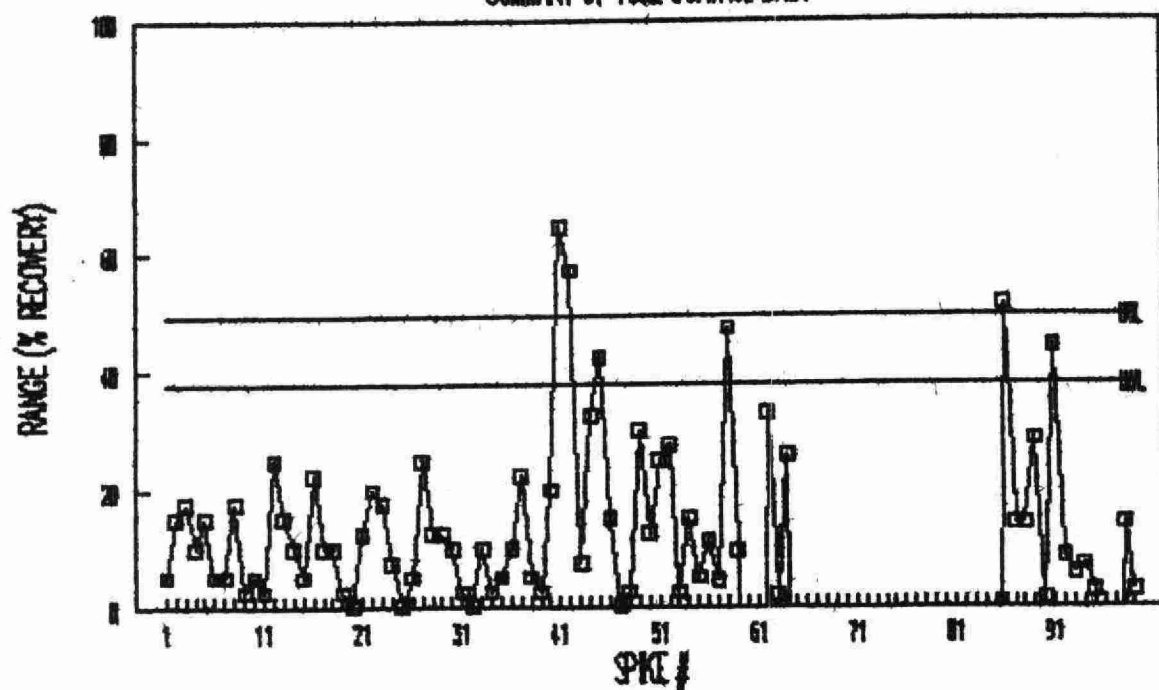
PWACB/OC: 135TBB

SUMMARY OF 1992 CONTROL DATA



PWACB/OC: 135TBB

SUMMARY OF 1992 CONTROL DATA



ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: WWVOL E3276A

SAMPLE TYPE: EFFLUENTS

UNIT: WASTEWATER

SUPERVISOR: Y. JONES

PRINCIPLE OF METHOD:

The purgeable organic compounds determined by this method belong mainly to the "tonnage" industrial chemicals, essentially aromatic and chlorinated industrial solvents.

This method involves purge-and-trap Gas Chromatographic analysis with simultaneous Flame Ionization and Electron Capture Detection. Under optimum conditions, one technician can perform approximately 13 analysis per 24 hour day.

PARAMETERS MEASURED:

Group 1	Parameter	Test Code
	1,1-dichloroethylene	X111CY
	trans-1,2-dichloroethylene	X1T12D
	1,1-dichloroethane	X111CE
	chloroform	X1CHLO
	carbontetrachloride	X1CTET
	benzene	B2BENZ
	1,2-dichloropropane	X112CP
	trichloroethylene	X1TRIC
	dichlorobromomethane	X1BDCM
	toluene	B2TOLU
	1,1,2-trichloroethane	X1112T
	trichlorofluormethane	X1TCFM
	dichloromethane	X1DCLM
	1,1,1-trichloroethane	X1111T
	cis-1,3-dichloropropene	X113DP
	chlorodibromomethane	X1CDBM
	tetrachloroethylene	X1TETR
	chlorobenzene	X2CBEN
	ethylbenzene	B2EBNZ
	m & p-xylene	B2PXYL
	bromoform	X1BROM
	o-xylene	B2OXYL
	1,1,2,2-tetrachloroethane	X11122
	1,4-dichlorobenzene	X214CB
	1,3-dichlorobenzene	X213CB
	1,2-dichlorobenzene	X212CB
	trans-1,3-dichloropropene	X113DP

ethylenedibromide
styrene
cumene
mesitylene
p-cymene

X2EDB
B2STYR
B2CUME
B2MEST
B2PCYM

Group 2 Parameter

Test Code

acrolein
acrylonitrile

X1ACRO
X1ACRY

REPORTING RESULTS:

Results are reported in ug/L.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Internal Standards and Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC samples.

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Unknown compounds may co-elute or interfere with target compounds. Meta-xylene and para-xylene co-elute and are reported as a pair.

UNIT: Wastewater
 WORKSTATION: WWVOL
 TIME PERIOD: JAN.-DEC.1992

MATRIX: Effluent
 INSTRUMENT: GC-FID/ECD
 NO. OBSERVATIONS: 206

YEARLY CALCULATION

PARAMETER COMPOUND	EXP. CONC.	AVG. SPK. % REC.	STD. DEV. %REC.	% C.V.
1. FREON*	: 1.20	: 124	: 53	: 43
2. ACRO	: 9.76	: 60	: 56	: 94
3. 11DCLE	: 9.70	: 112	: 26	: 23
4. 11DCLE*	: 9.70	: 103	: 26	: 25
5. DCLM	: 5.3	: 94	: 57	: 60
6. DCLM*	: 5.3	: 73	: 32	: 44
7. ACRY	: 4.84	: 74	: 38	: 52
8. T-12DCLE	: 5.12	: 153	: 64	: 42
9. 11DCLETHANE	: 4.7	: 137	: 56	: 41
10. 11DCLETHANE*	: 4.7	: 111	: 7	: 7
11. CHLORO*	: 5.9	: 99	: 18	: 18
12. 111TRI*	: 5.35	: 103	: 21	: 20
13. CARBONTET*	: 6.35	: 101	: 22	: 22
14. 12DCLETHANE	: 5.02	: 131	: 49	: 37
15. BENZENE	: 3.52	: 101	: 9	: 9
16. TRI	: 5.89	: 93	: 11	: 12
17. TRI*	: 5.89	: 98	: 17	: 18
18. 12DCLPROP	: 4.63	: 96	: 9	: 9
19. 12DCLPROP*	: 4.63	: 65	: 38	: 58
20. DCLBRME	: 7.91	: 100	: 11	: 11
21. DCLBRME*	: 7.91	: 100	: 21	: 21

UNIT: Wastewater
 WORKSTATION: WWVOL
 TIME PERIOD: 1991
 NO. OBSERVATIONS: 120

MATRIX: Effluent
 INSTRUMENT: GC -FID/ECD
 CHANNEL:

YEARLY CALCULATION

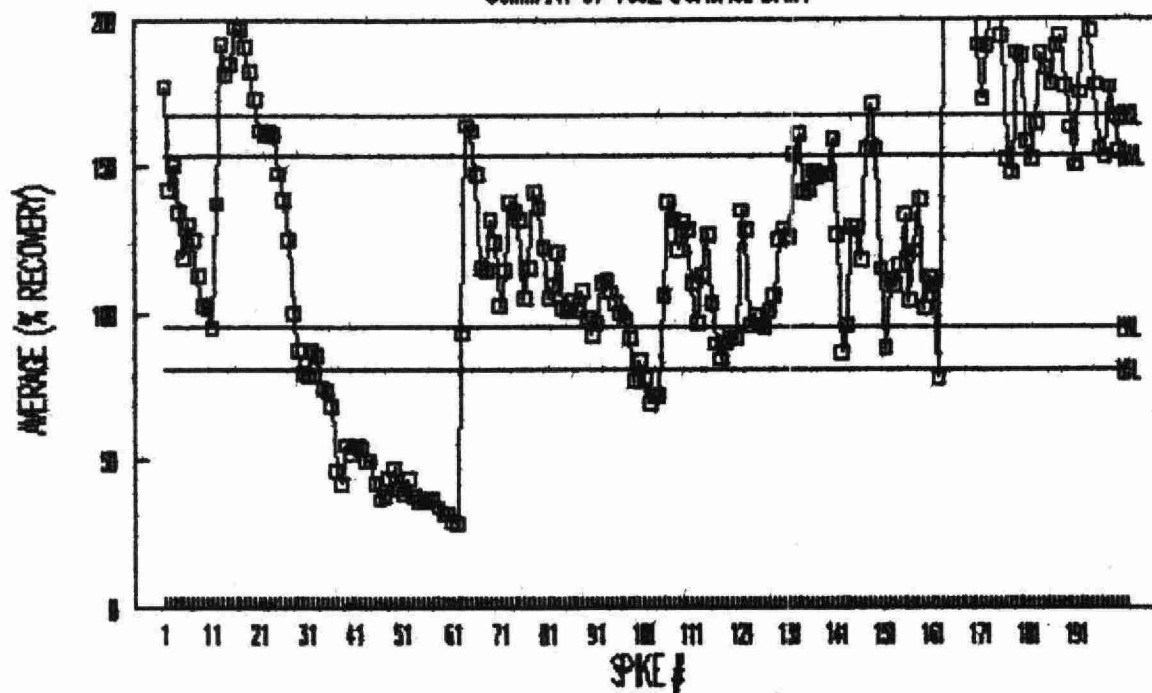
PARAMETER COMPOUND	EXP. CONC.	AVG. SPK. % REC.	STD. DEV. %REC>	% C.V.
22. CIS13DCP	: 7.68	: 90	: 14	: 15
23. CIS13DCP*	: 7.68	: 92	: 16	: 18
24. TOLUENE	: 3.47	: 94	: 14	: 15
25. TRANS-13DCPR	: 4.68	: 94	: 13	: 14
26. TRANS-13DCPR*	: 4.68	: 89	: 18	: 20
27. 112TRI	: 5.74	: 95	: 10	: 10
28. 112TRI*	: 5.74	: 91	: 19	: 21
29. TETRACHLE	: 6.49	: 90	: 17	: 19
30. TETRACHLE*	: 6.49	: 95	: 19	: 20
31. CLDBRME	: 9.8	: 96	: 11	: 12
32. CLDBRME*	: 9.8	: 101	: 18	: 18
33. EDB	: 8.68	: 99	: 9	: 9
34. EDB*	: 8.68	: 105	: 21	: 20
35. CHLBENZ	: 4.42	: 97	: 8	: 8
36. ETHLBENZ	: 3.47	: 95	: 11	: 11
37. M/P-XYL	: 6.94	: 79	: 25	: 31
38. O-XYL	: 3.52	: 95	: 10	: 10
39. STYRENE	: 3.62	: 97	: 9	: 10
40. CUMENE	: 2.55	: 97	: 15	: 15
41. BROMOFORM*	: 11.61	: 101	: 17	: 17
42. 1122-TETRA	: 6.34	: 102	: 55	: 54

43. 1122-TETRA*	:	6.34	:	105	:	65	:	61
44. MESITYLENE	:	3.22	:	98	:	9	:	10
45. P-CYMENE	:	4.35	:	83	:	20	:	24
46. M-DCLBENZ	:	5.15	:	97	:	8	:	9
47. M-DCLBENZ*	:	5.15	:	94	:	17	:	18
48. P-DCLBENZ	:	3.60	:	125	:	39	:	31
49. P-DCLBENZ*	:	3.60	:	118	:	39	:	33
50. O-DCLBENZ	:	5.22	:	99	:	11	:	11
51. O-DCLBENZ*	:	5.22	:	97	:	15	:	15
52. D4-12DCLE	:	25.0	:	92	:	10	:	11
53. D8-TOLUENE	:	12.5	:	94	:	10	:	11
54. D5-CLBENZ	:	12.5	:	92	:	10	:	11
55. D4-T13P	:	12.5	:	93	:	12	:	13
56. D4-T13P*	:	12.5	:	90	:	15	:	17
57. D4-EDB	:	25.0	:	95	:	10	:	10
58. D4-EDB*	:	25.0	:	98	:	16	:	16
59. D4-C13P	:	12.5	:	91	:	11	:	11
60. D4-C13P*	:	12.5	:	92	:	15	:	16
61. D3-112T	:	12.5	:	95	:	9	:	10
62. D3-112T*	:	12.5	:	91	:	16	:	18
63. D10-OXY	:	12.5	:	93	:	9	:	10
64. D4-ODCB	:	12.5	:	95	:	10	:	10
65. D4-ODCB *	:	12.5	:	93	:	13	:	14

* DETECTOR - ECD

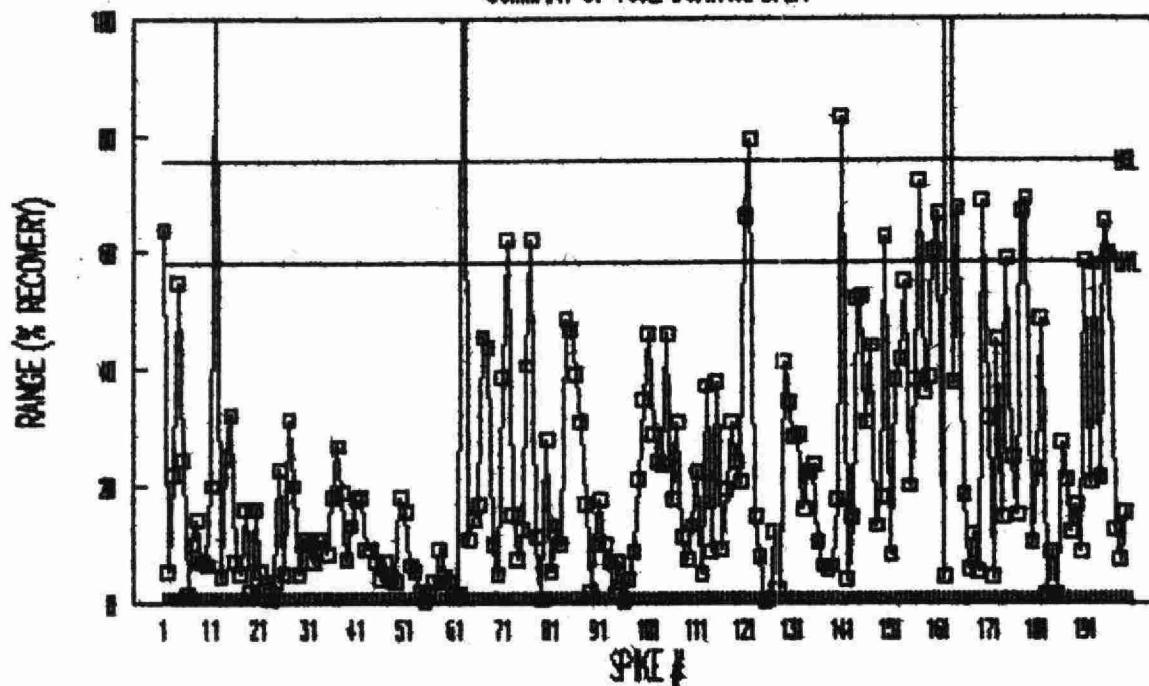
MSAVOL:FREON (ecd)

SUMMARY OF 1992 CONTROL DATA



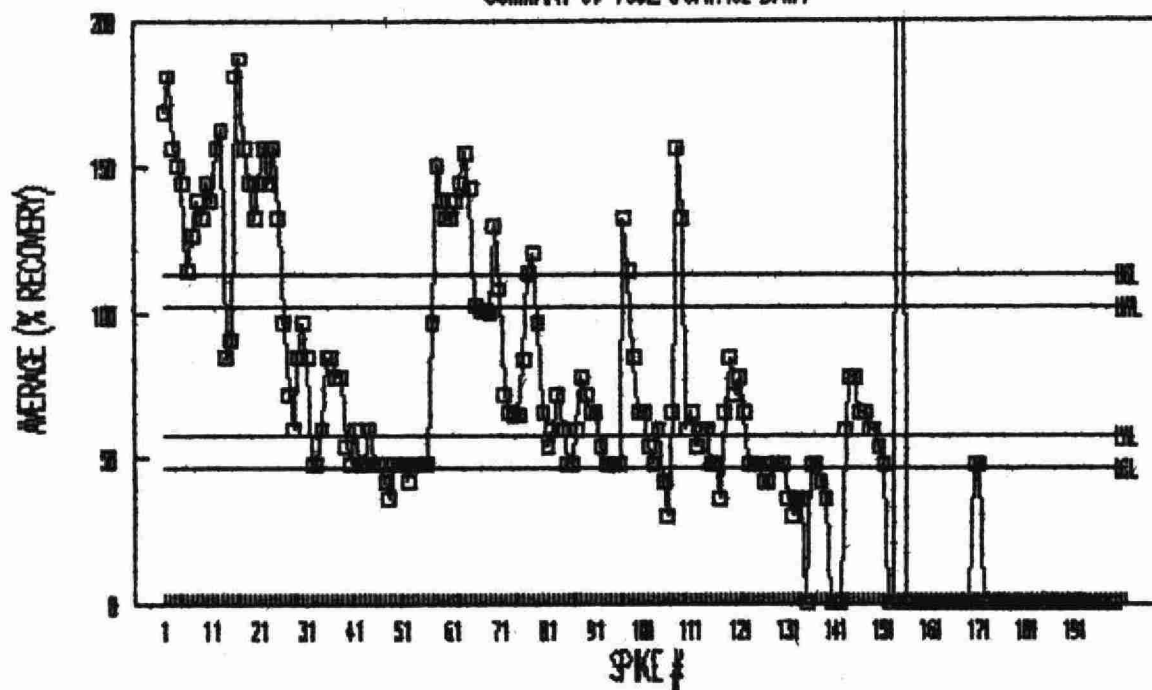
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SUMMARY OF 1992 CONTROL DATA



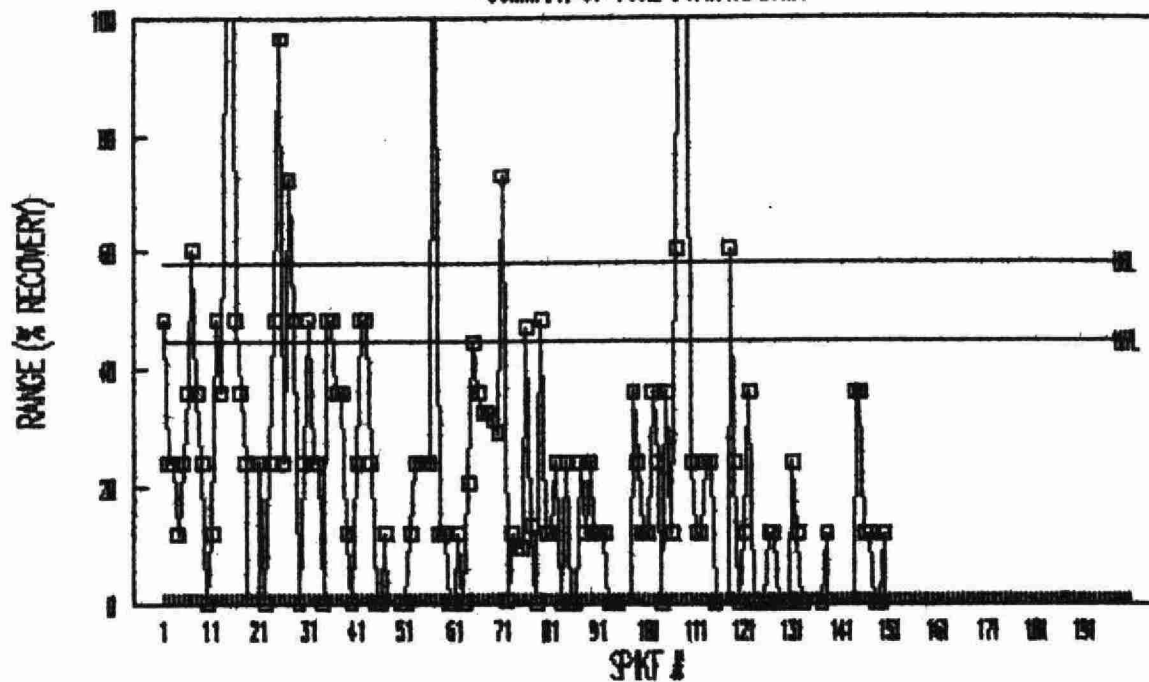
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SUMMARY OF 1992 CONTROL DATA



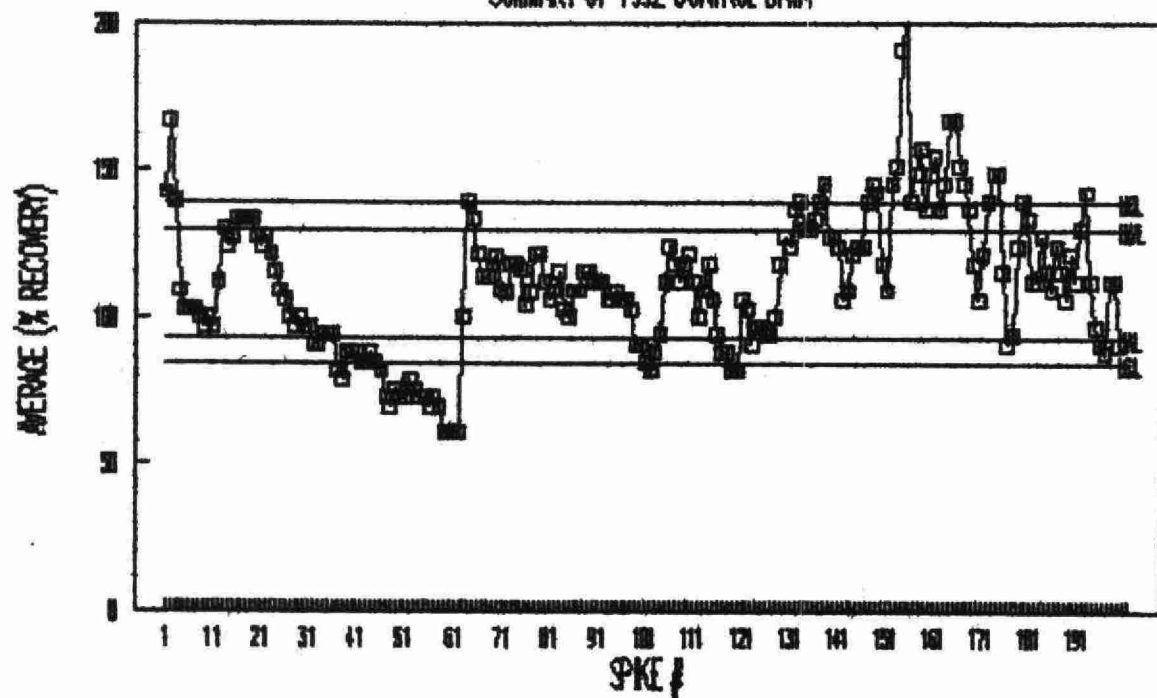
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SUMMARY OF 1992 CONTROL DATA



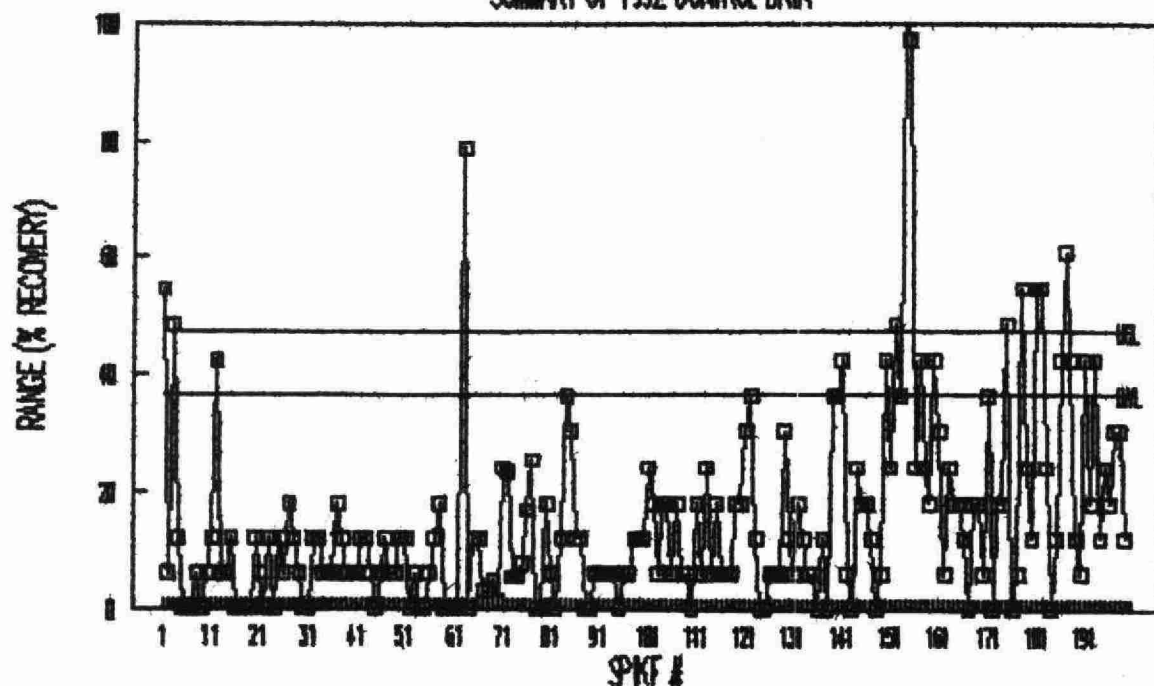
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SUMMARY OF 1992 CONTROL DATA



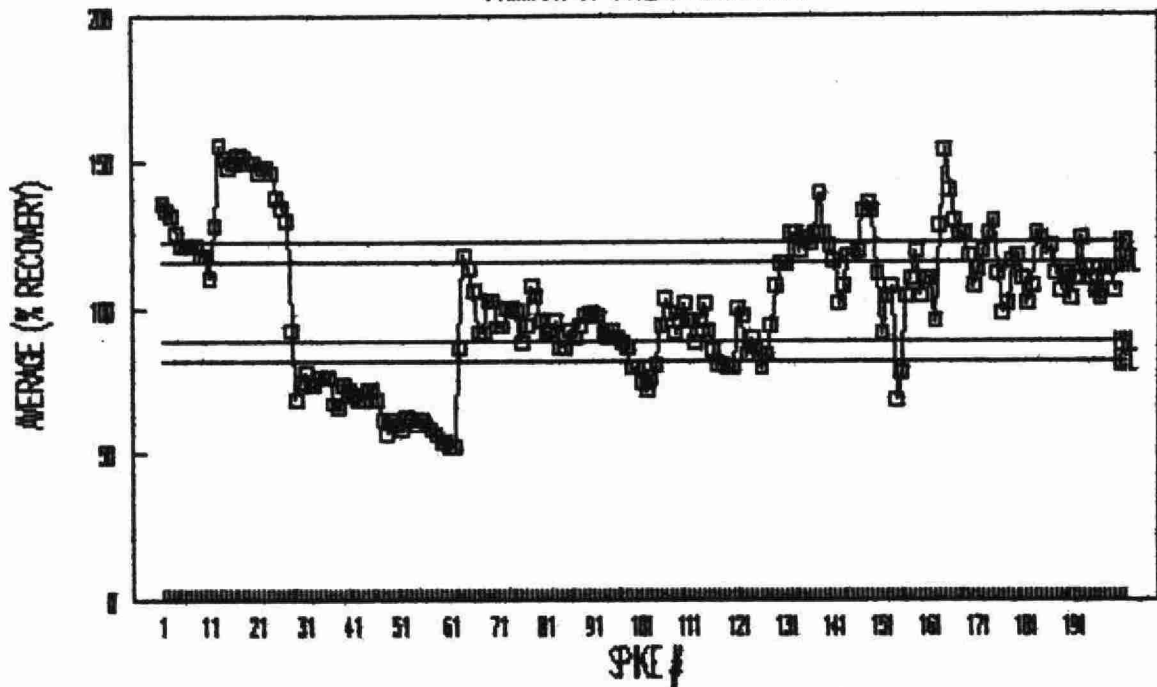
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SUMMARY OF 1992 CONTROL DATA



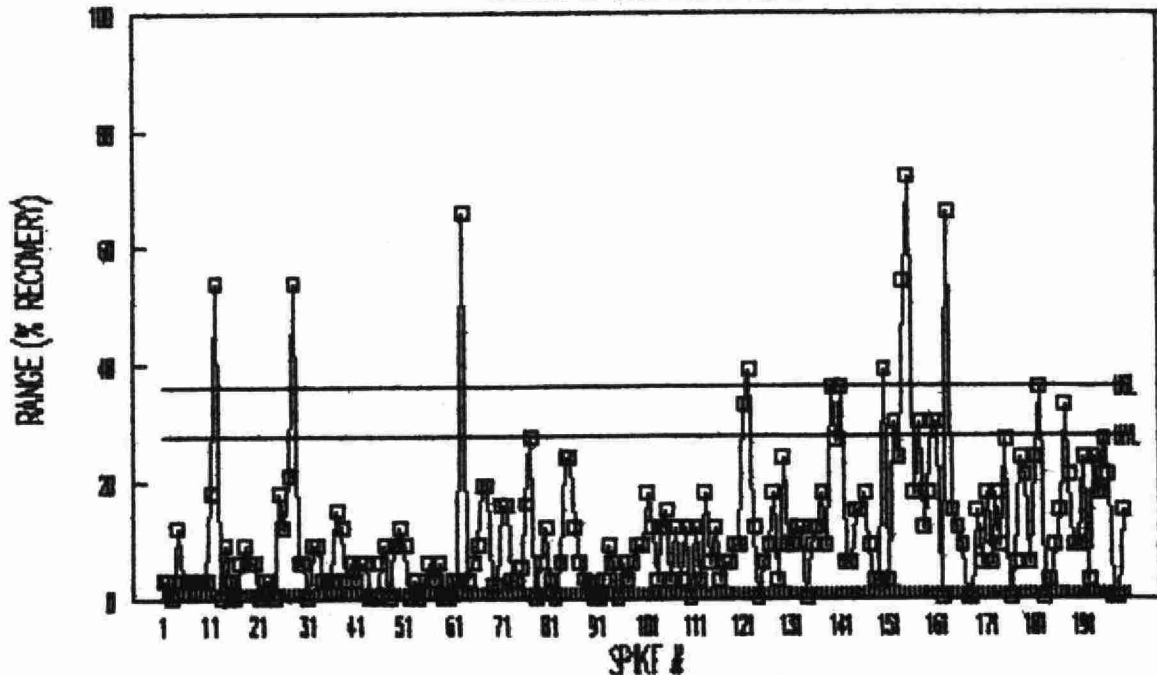
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SUMMARY OF 1992 CONTROL DATA



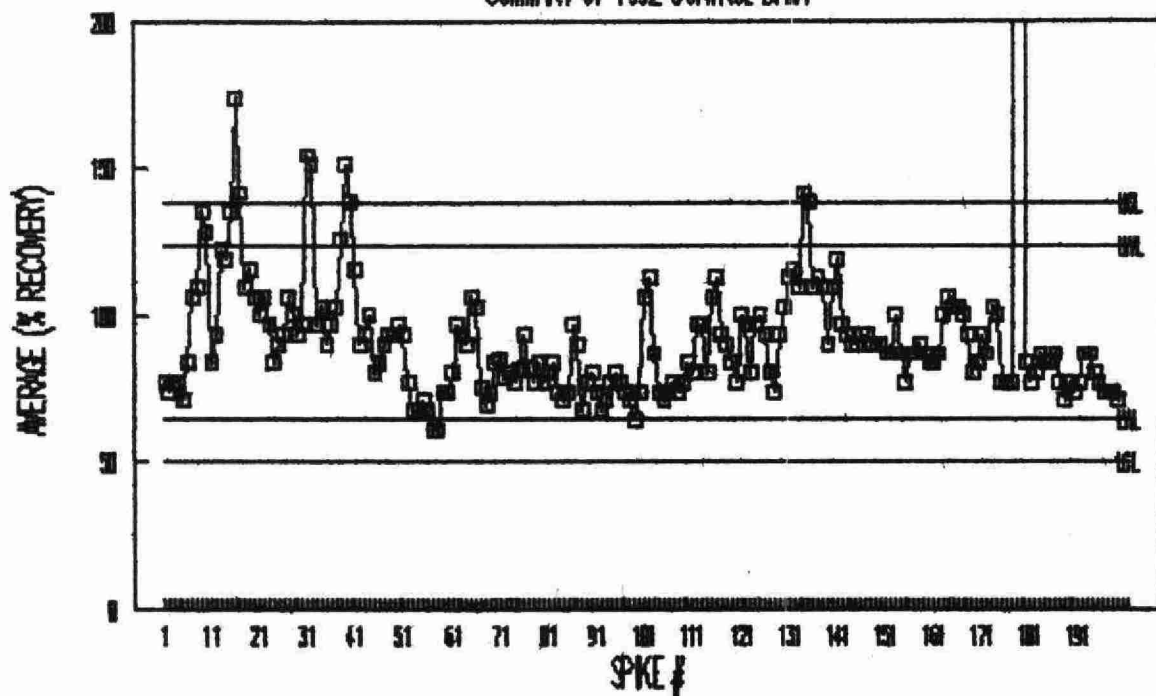
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SUMMARY OF 1992 CONTROL DATA



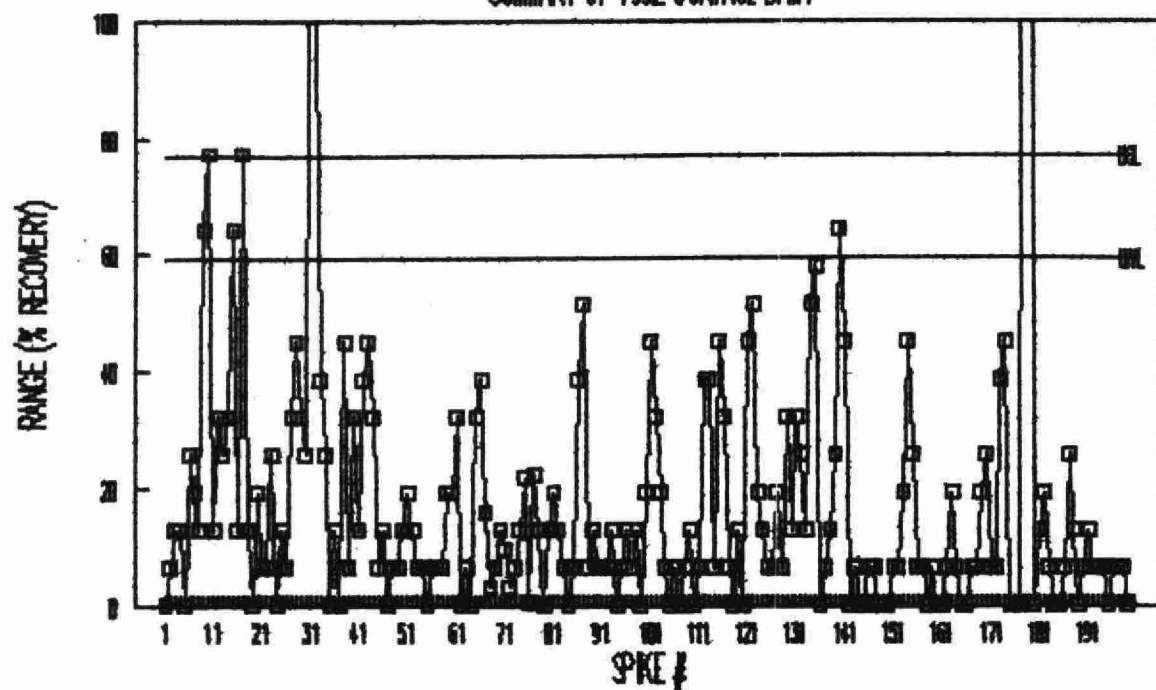
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SUMMARY OF 1992 CONTROL DATA



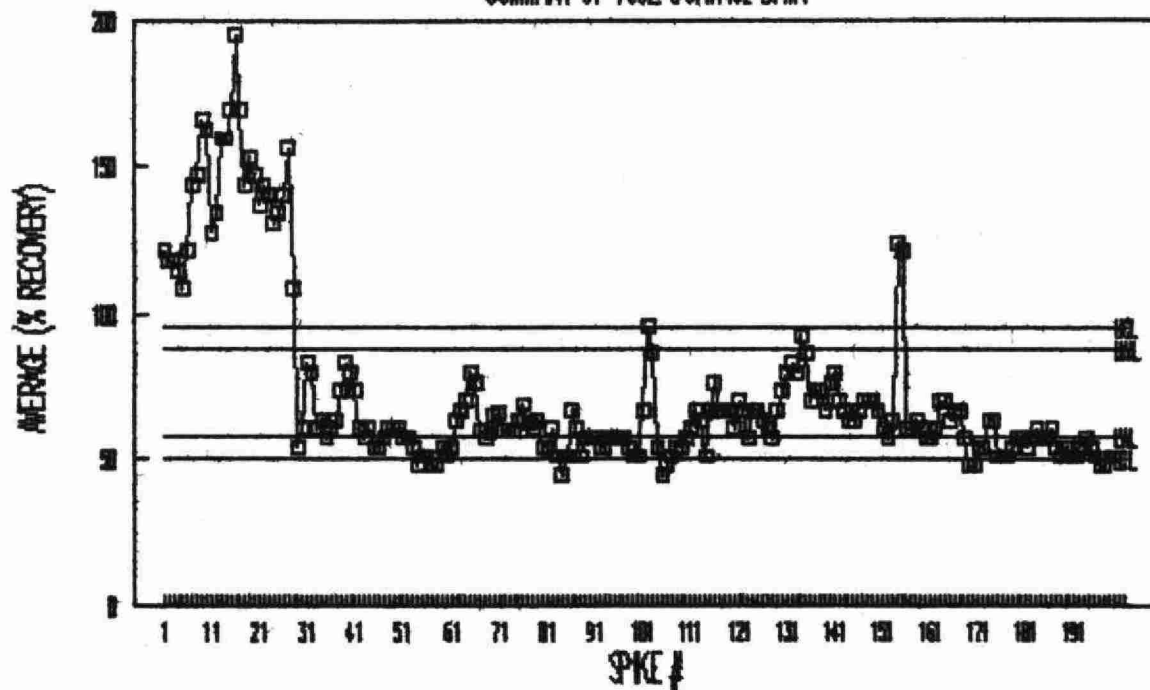
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SUMMARY OF 1992 CONTROL DATA



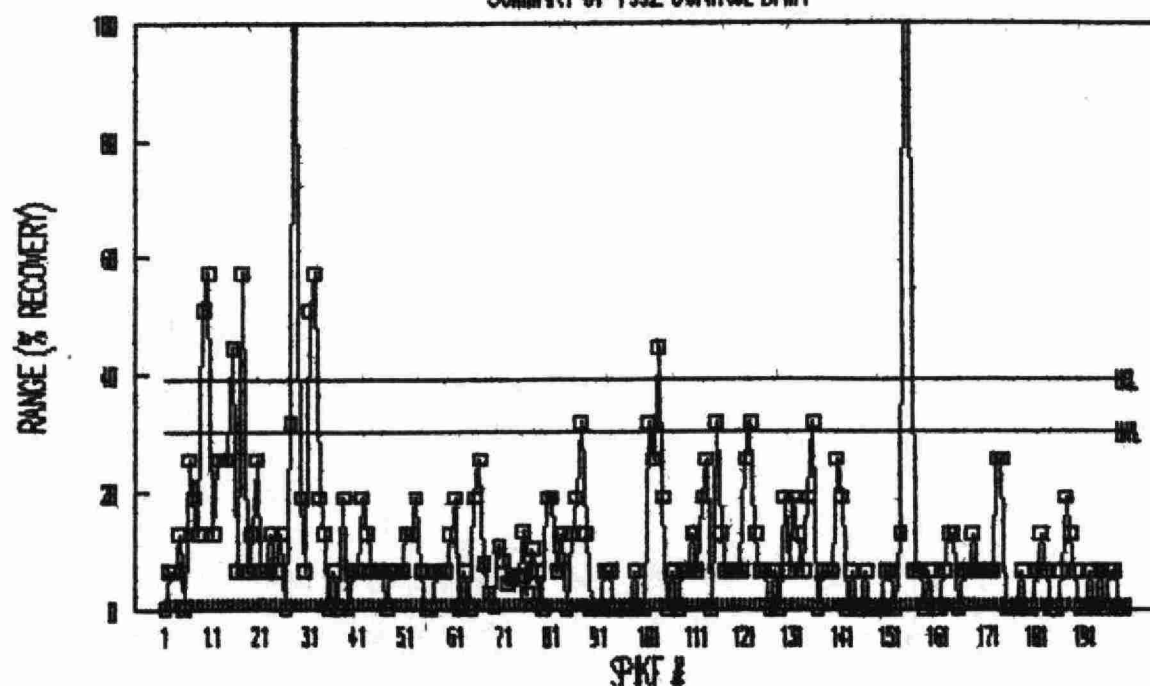
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SUMMARY OF 1992 CONTROL DATA



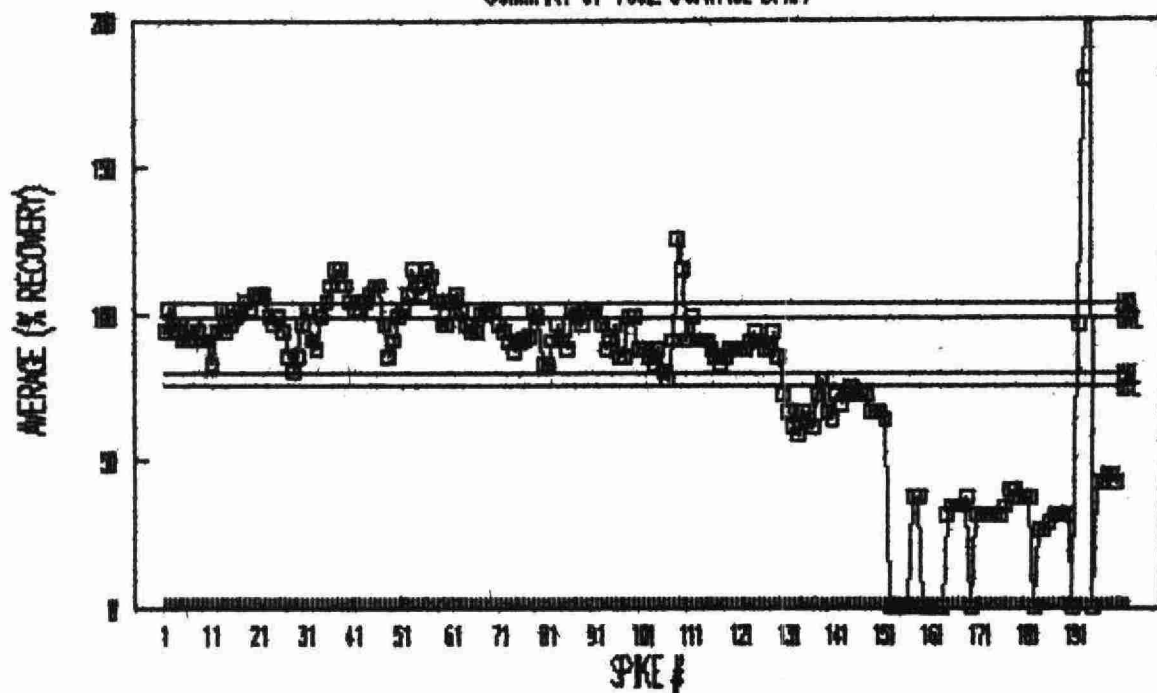
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SUMMARY OF 1992 CONTROL DATA



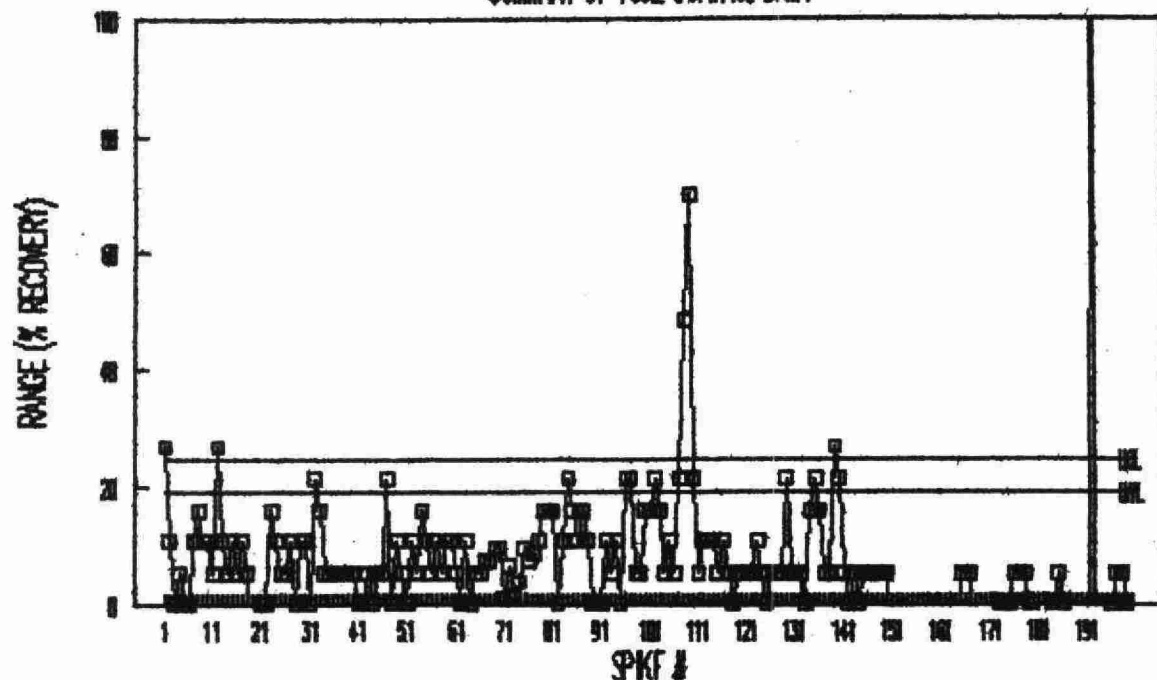
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SUMMARY OF 1992 CONTROL DATA



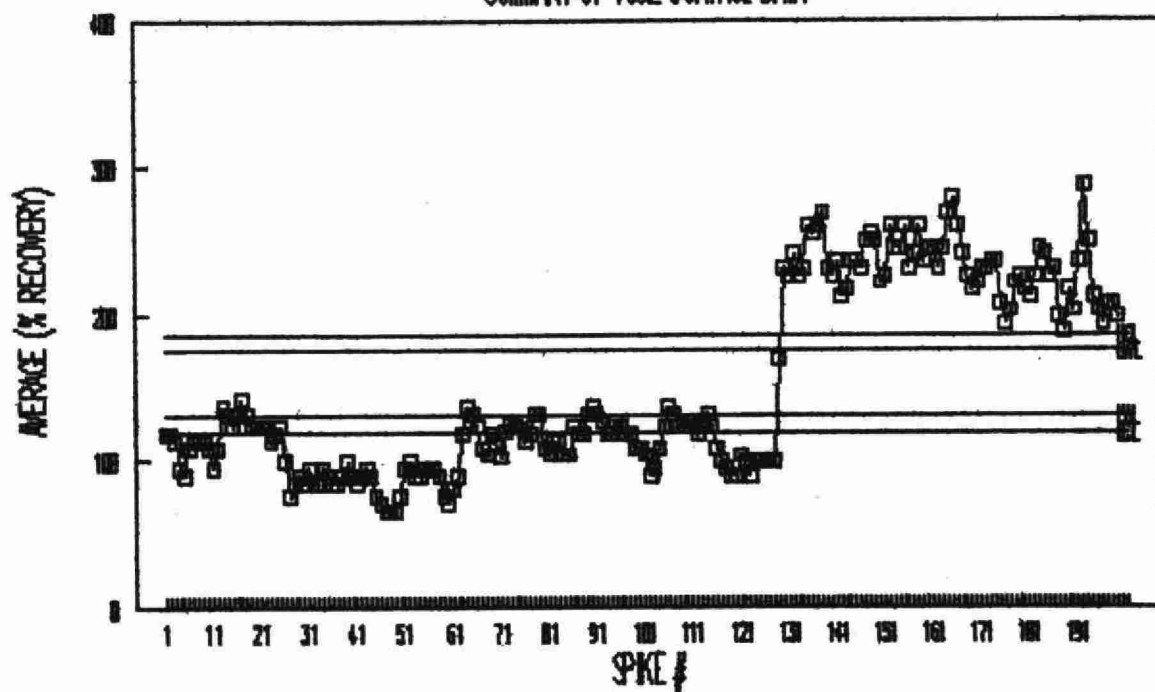
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SUMMARY OF 1992 CONTROL DATA



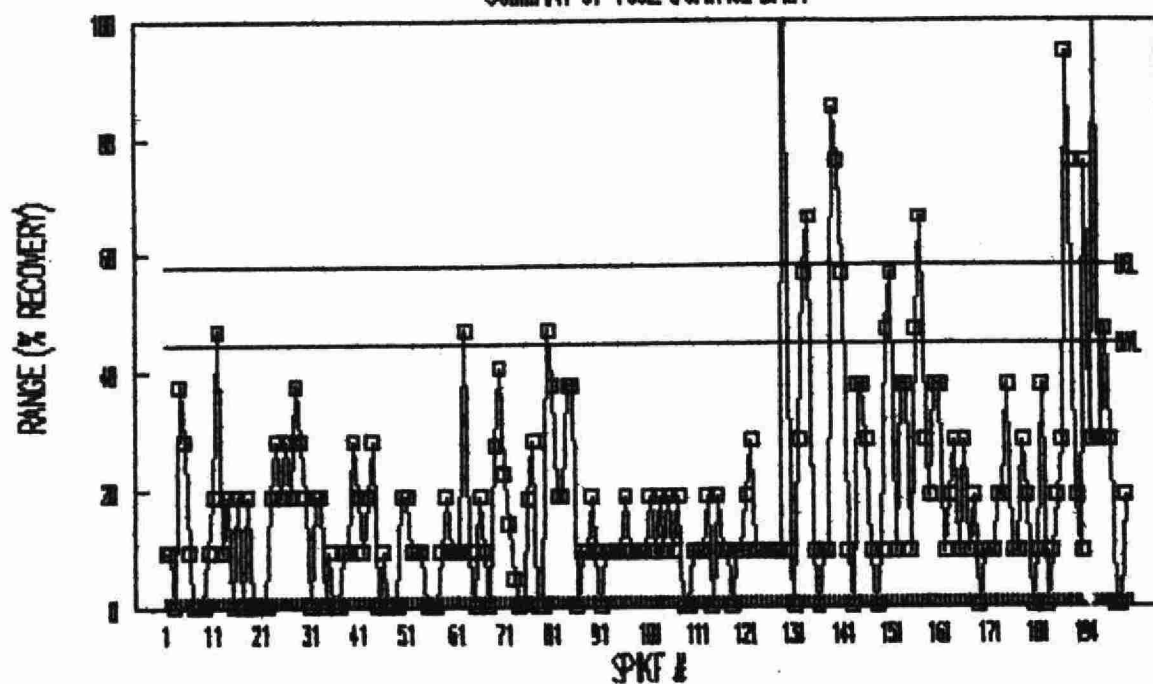
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SUMMARY OF 1992 CONTROL DATA



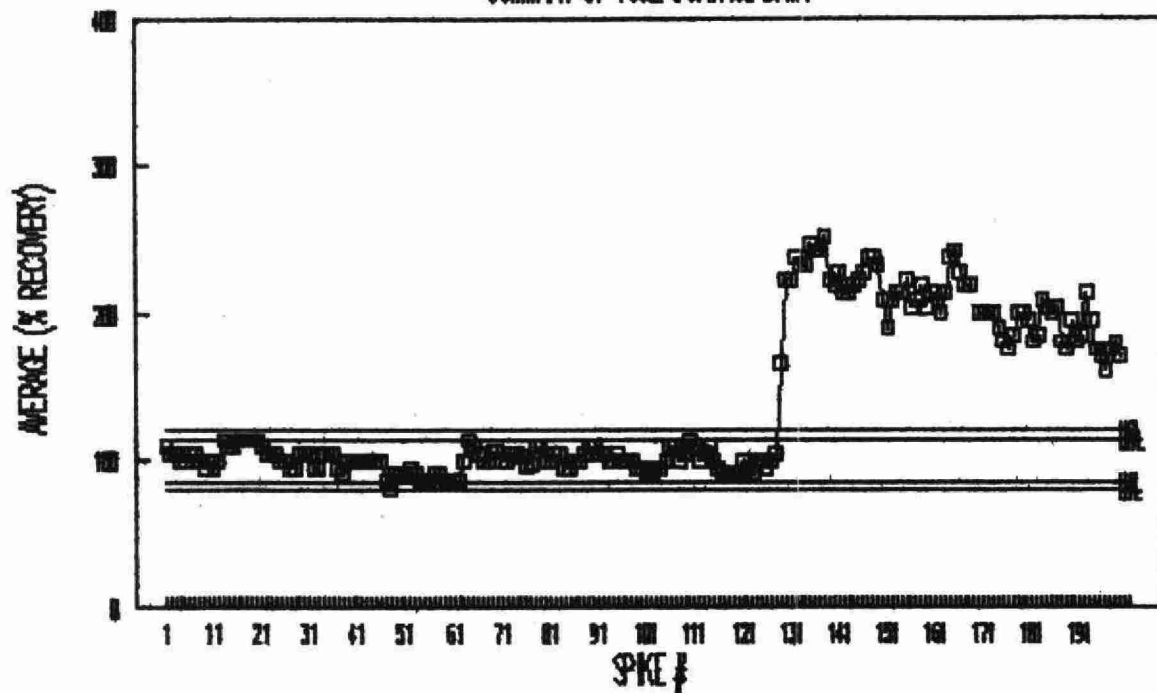
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SUMMARY OF 1992 CONTROL DATA



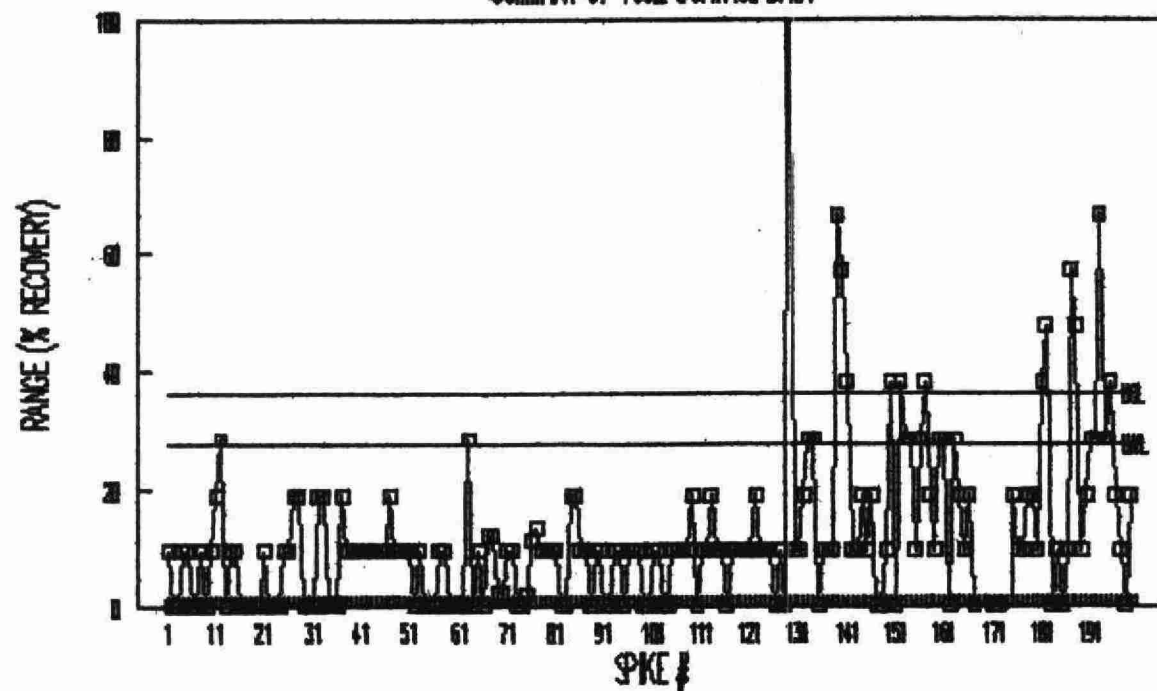
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SUMMARY OF 1992 CONTROL DATA



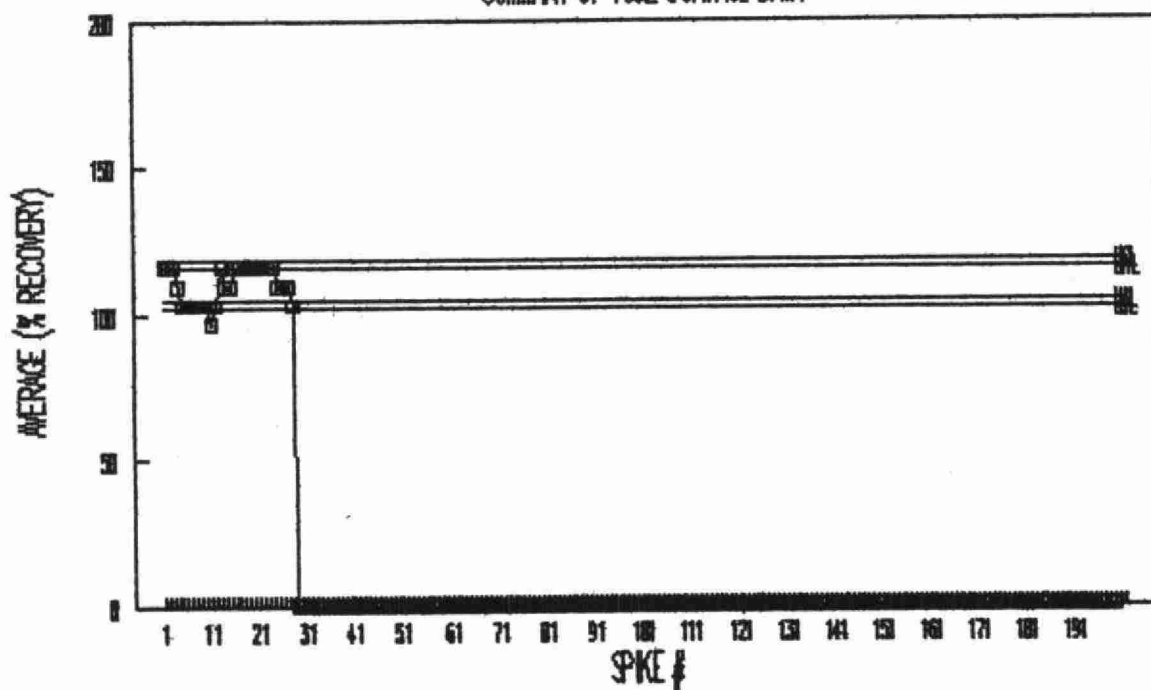
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SUMMARY OF 1992 CONTROL DATA



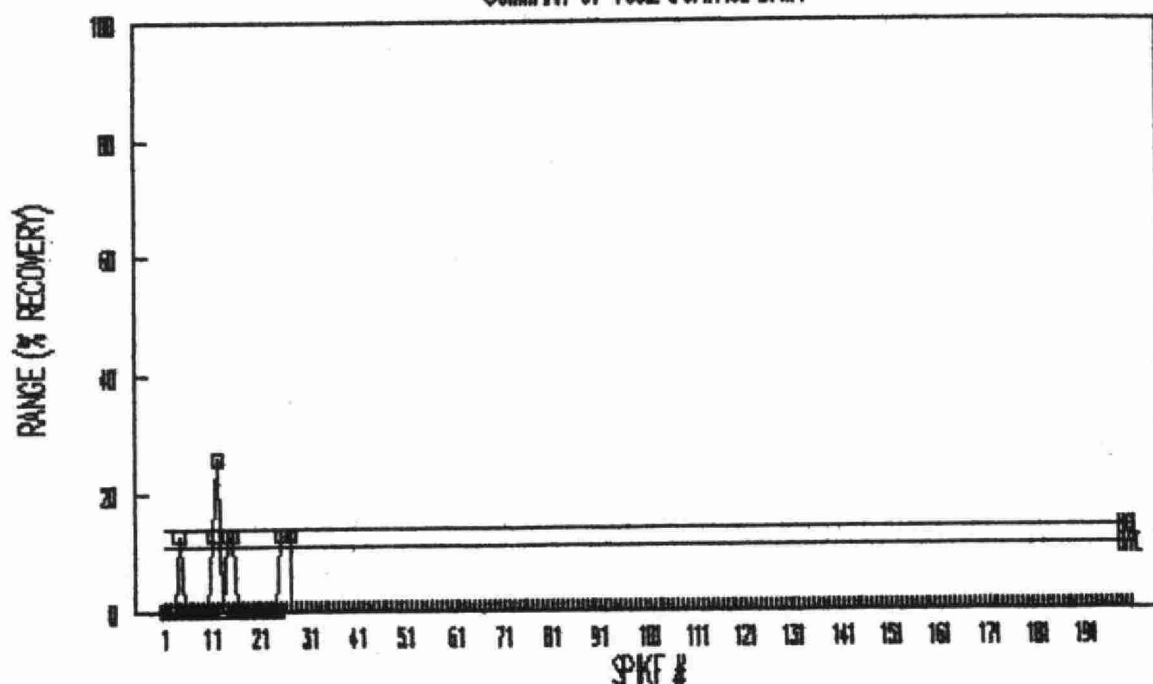
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SUMMARY OF 1992 CONTROL DATA



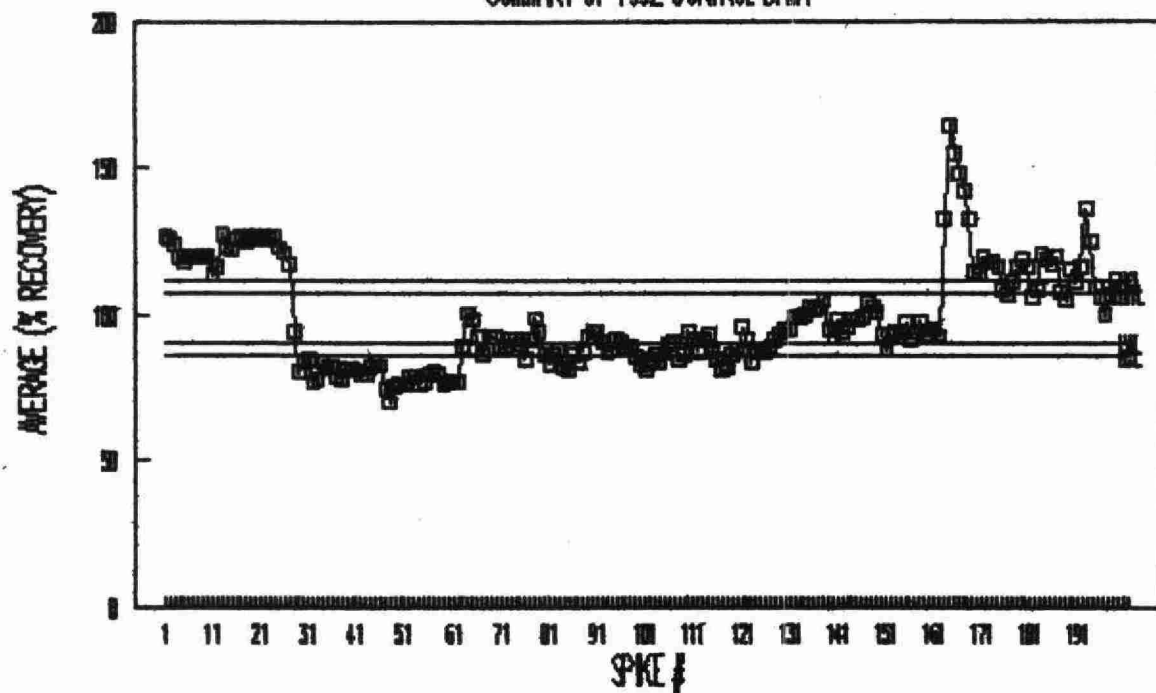
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SUMMARY OF 1992 CONTROL DATA



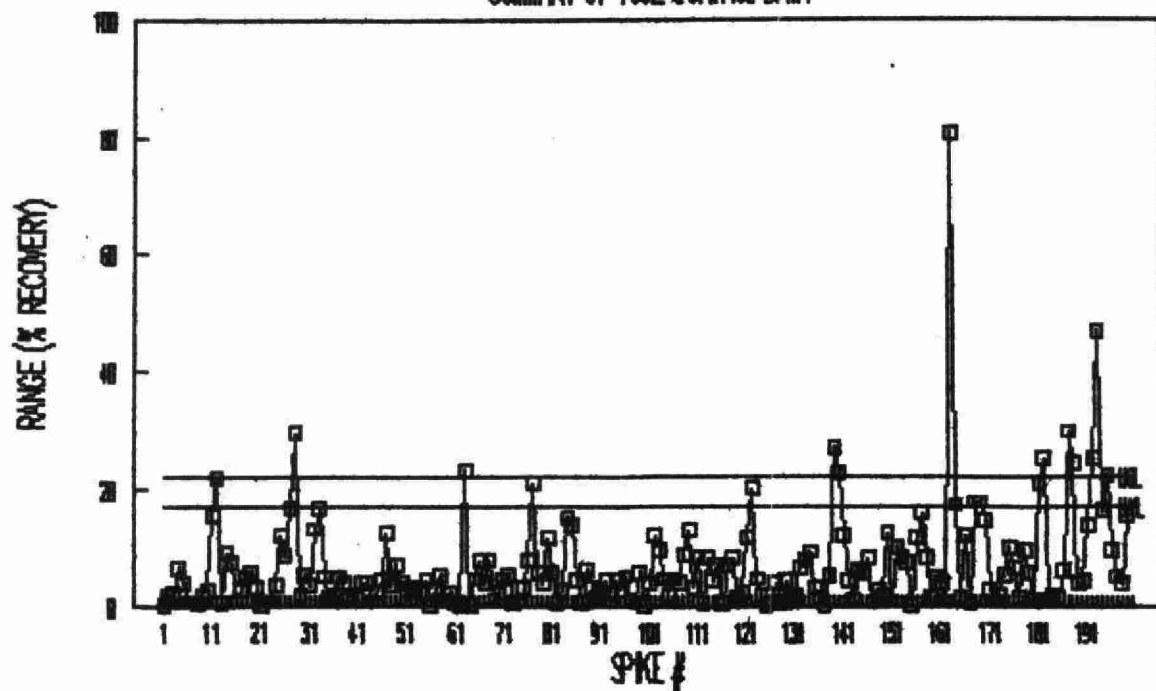
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SUMMARY OF 1992 CONTROL DATA



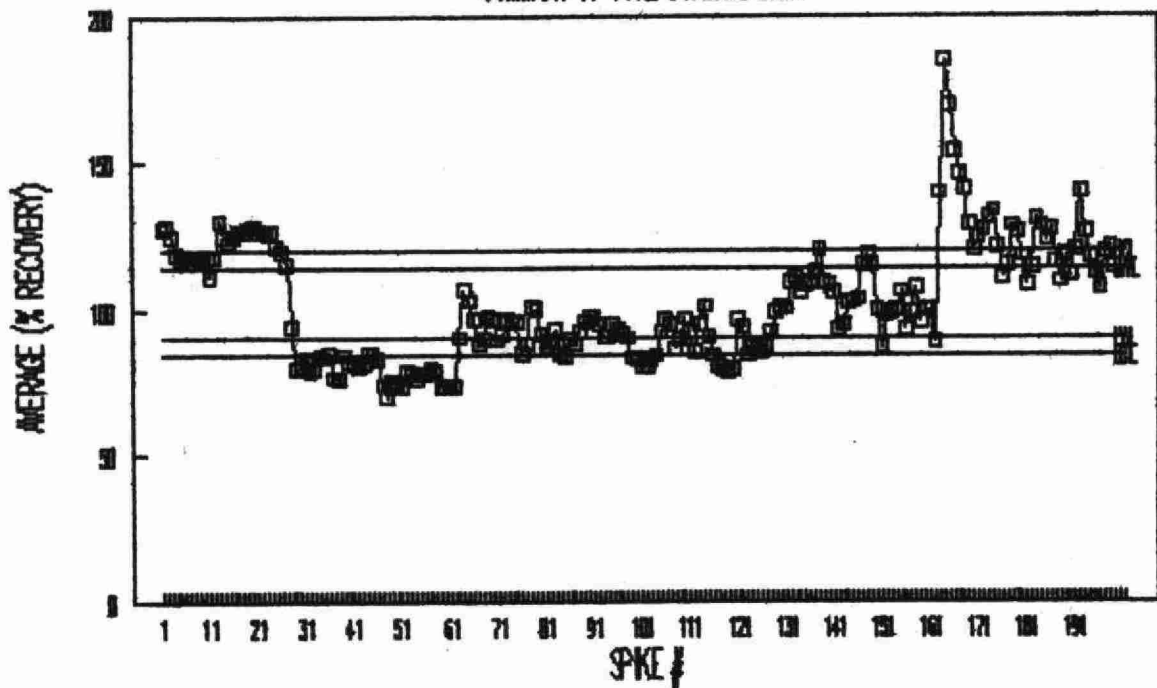
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SUMMARY OF 1992 CONTROL DATA



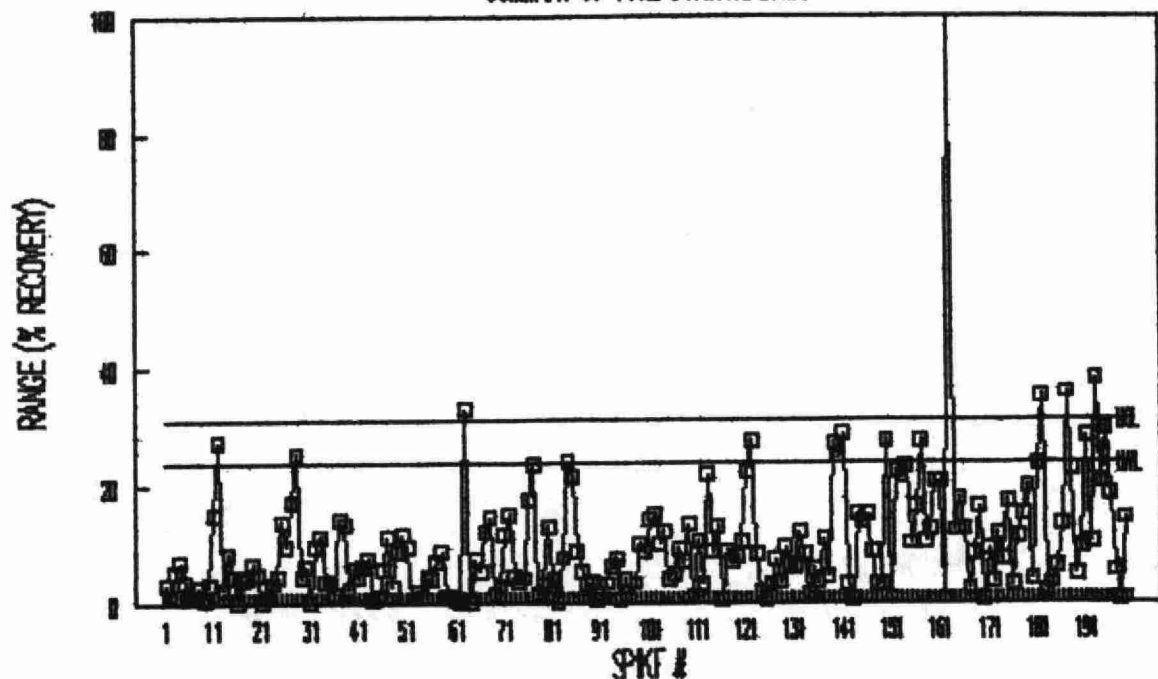
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SUMMARY OF 1992 CONTROL DATA



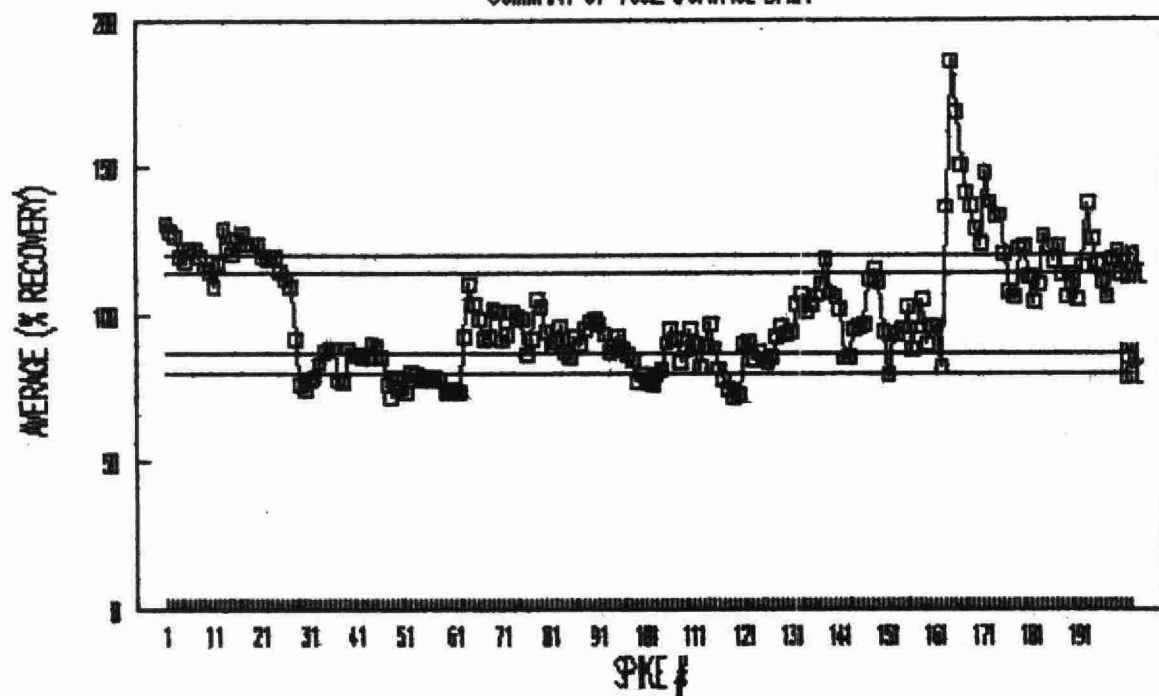
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SUMMARY OF 1992 CONTROL DATA



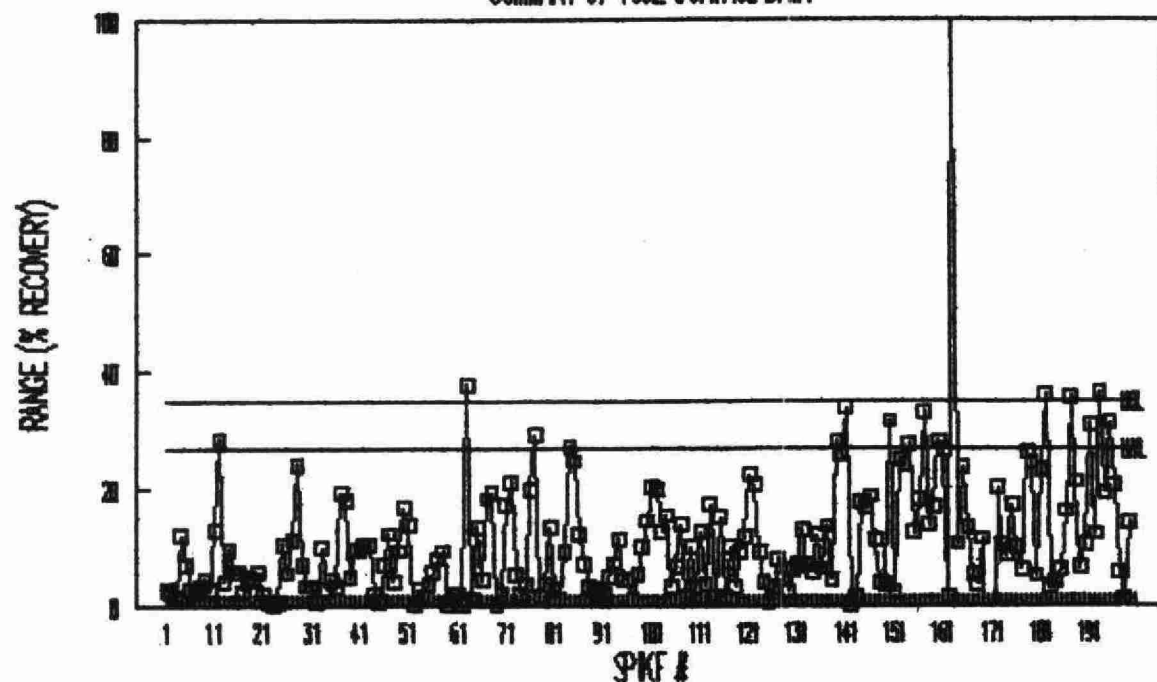
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SUMMARY OF 1992 CONTROL DATA



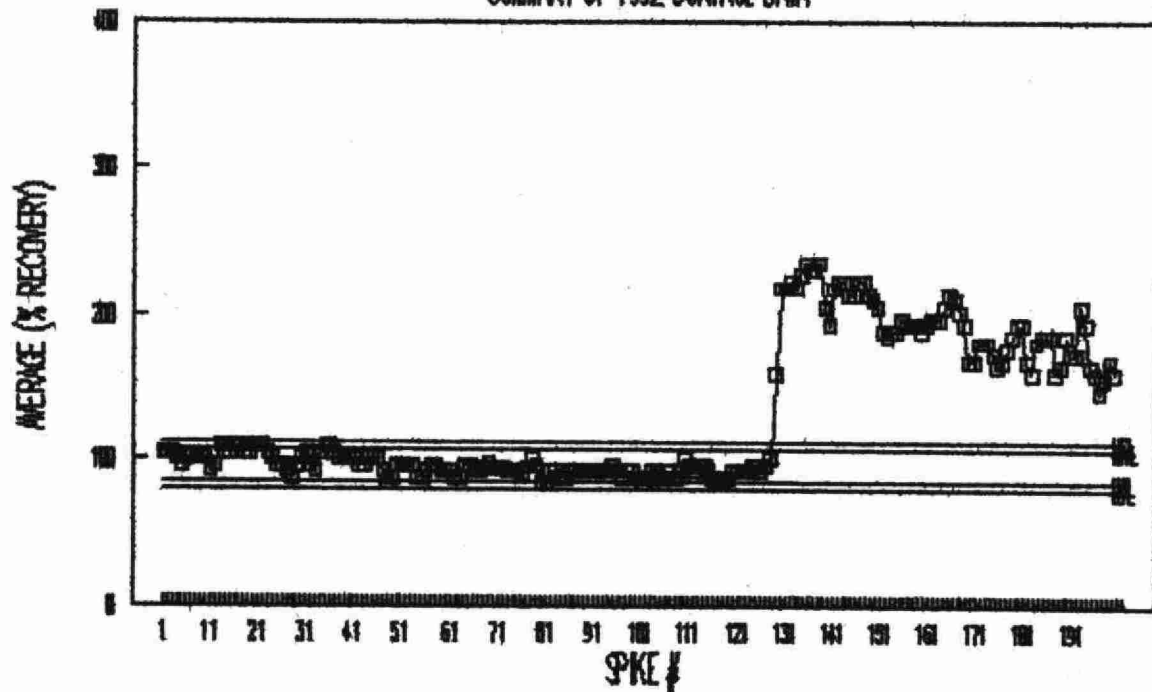
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SUMMARY OF 1992 CONTROL DATA



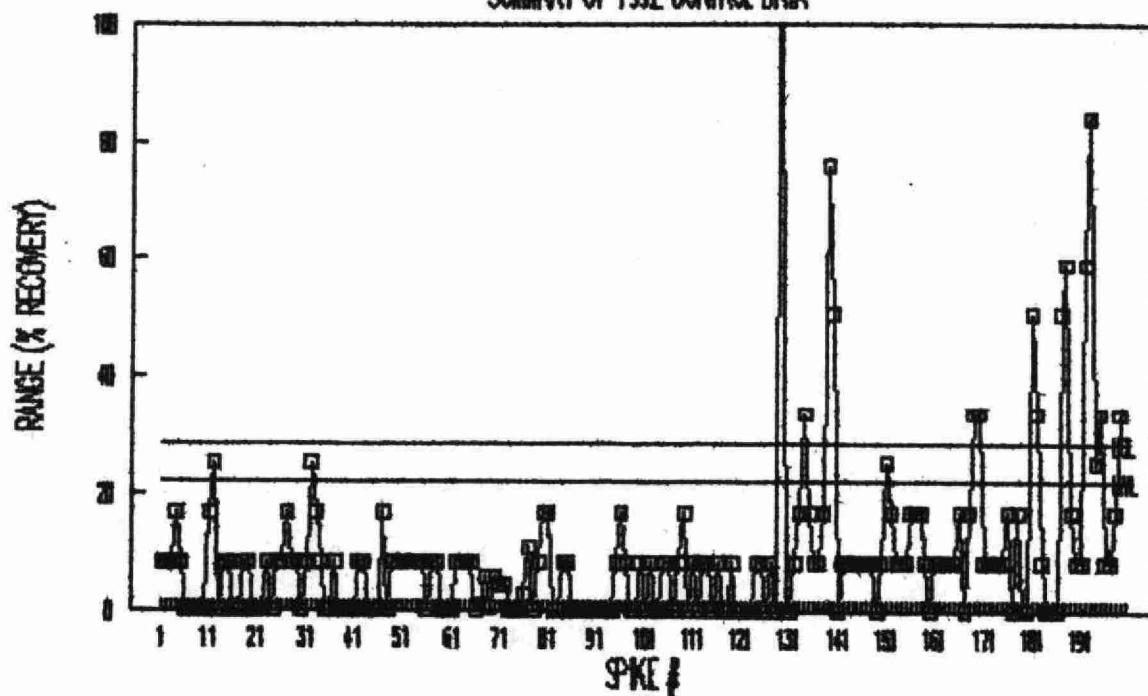
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SUMMARY OF 1992 CONTROL DATA



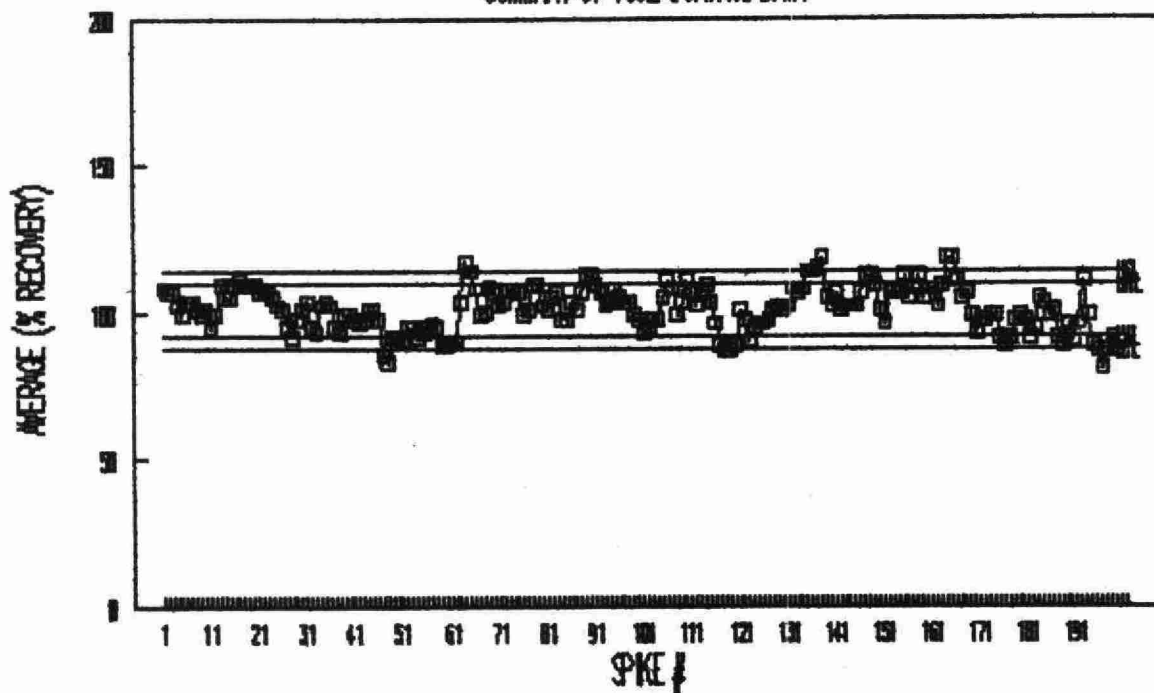
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SUMMARY OF 1992 CONTROL DATA



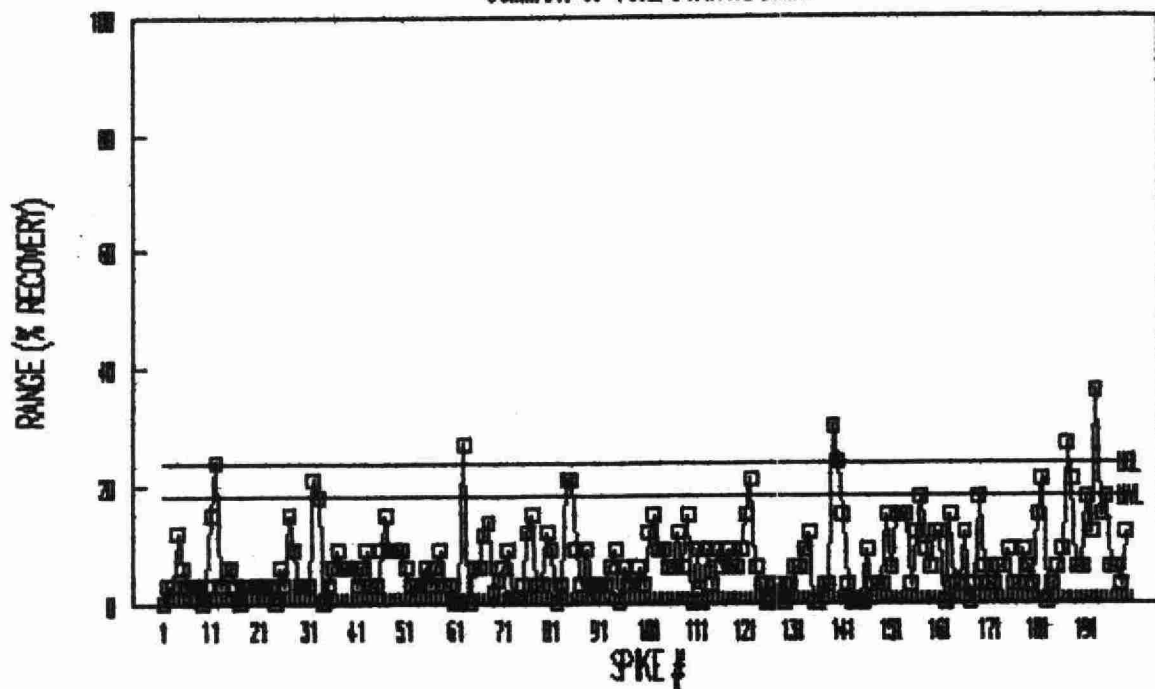
MSAVOL:BENZ (fid)

SUMMARY OF 1992 CONTROL DATA



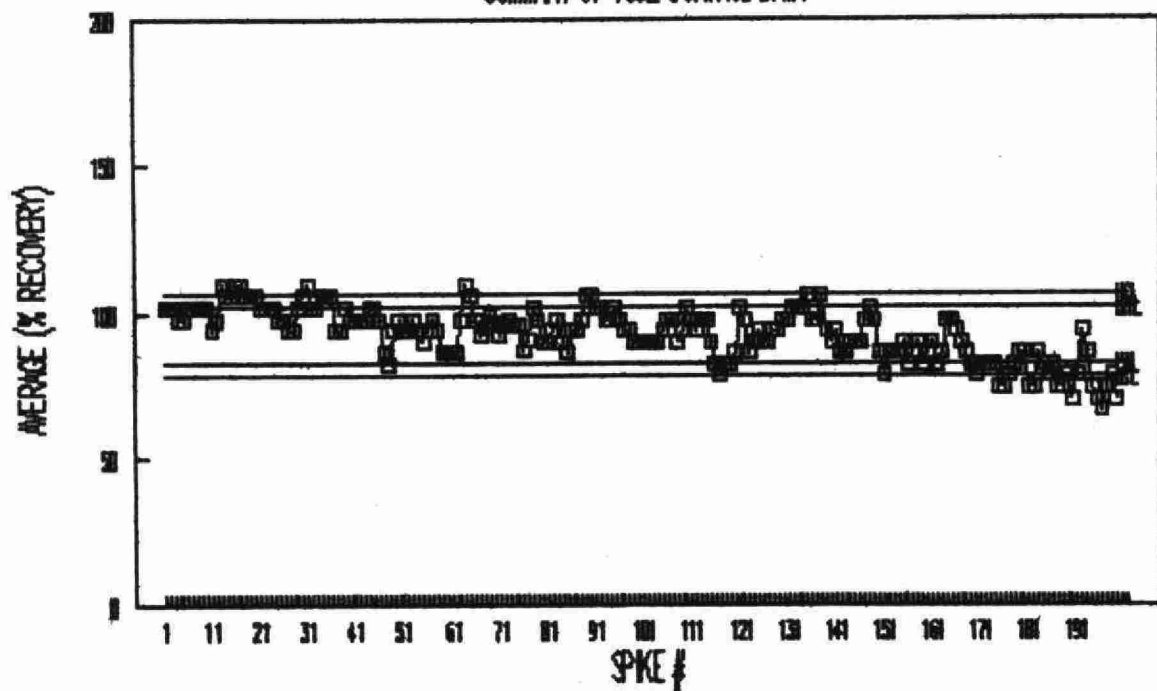
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SUMMARY OF 1992 CONTROL DATA



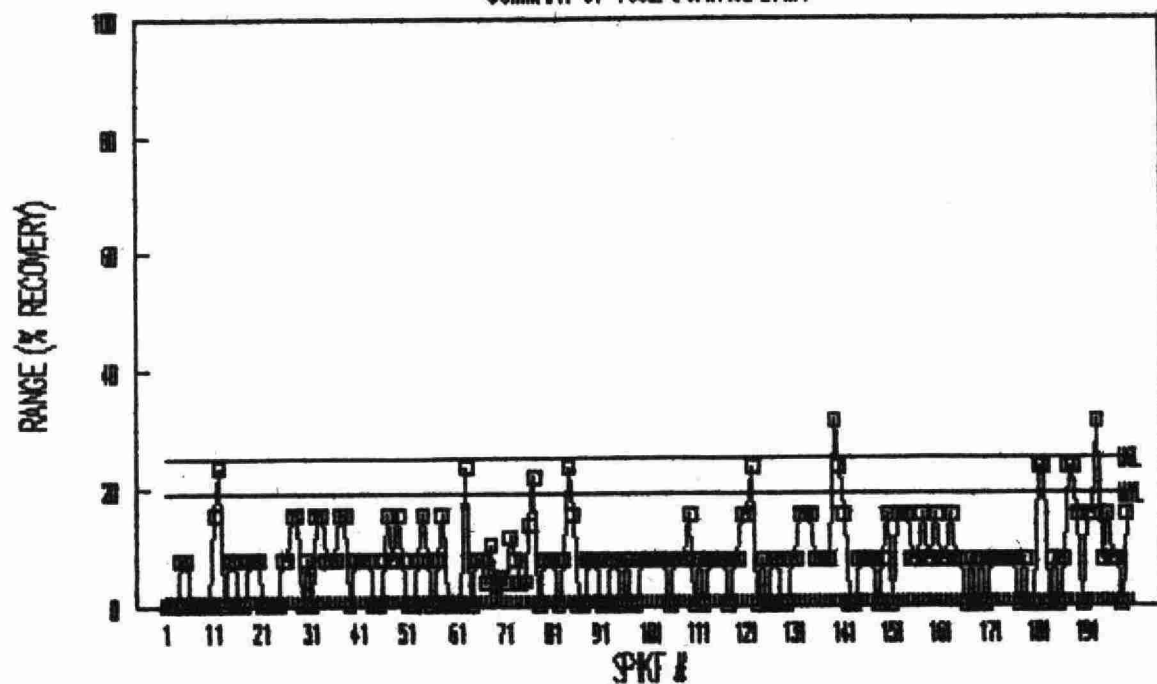
MSAVOL:TRIC (fid)

SUMMARY OF 1992 CONTROL DATA



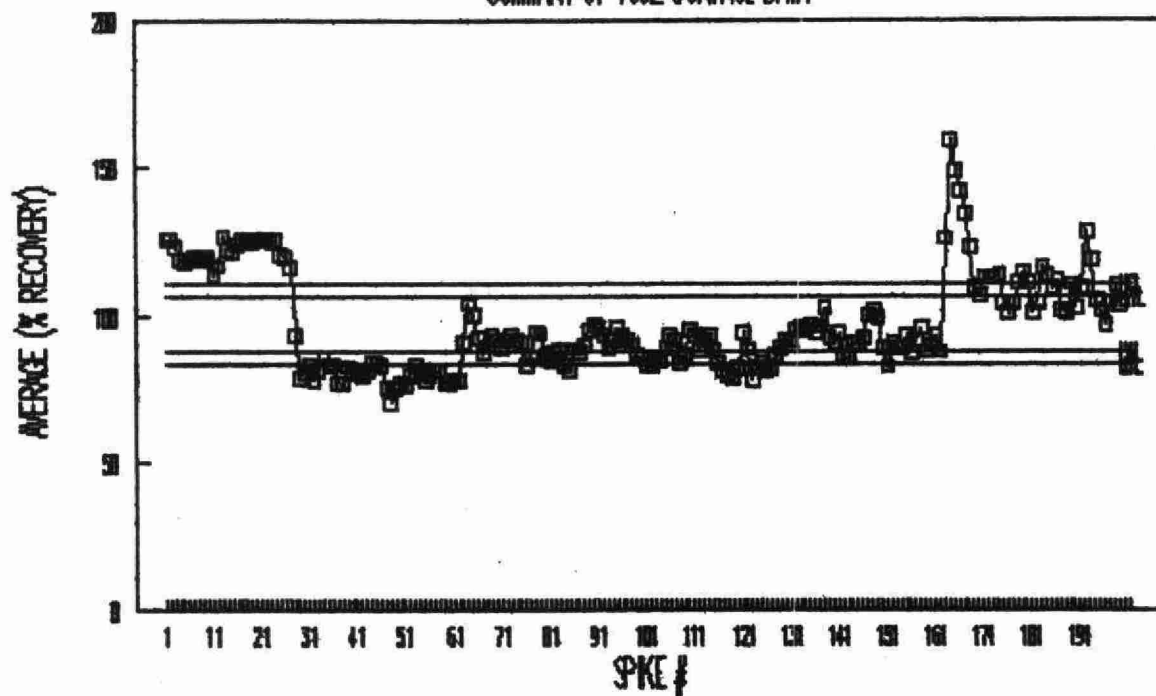
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SUMMARY OF 1992 CONTROL DATA



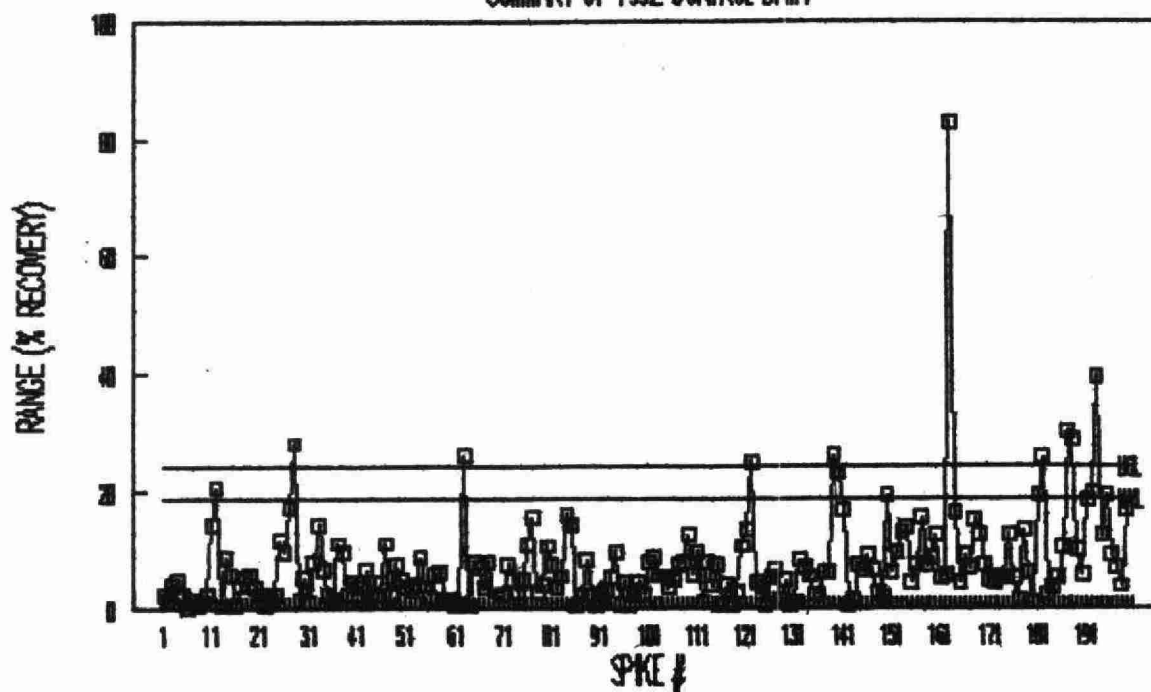
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SUMMARY OF 1992 CONTROL DATA



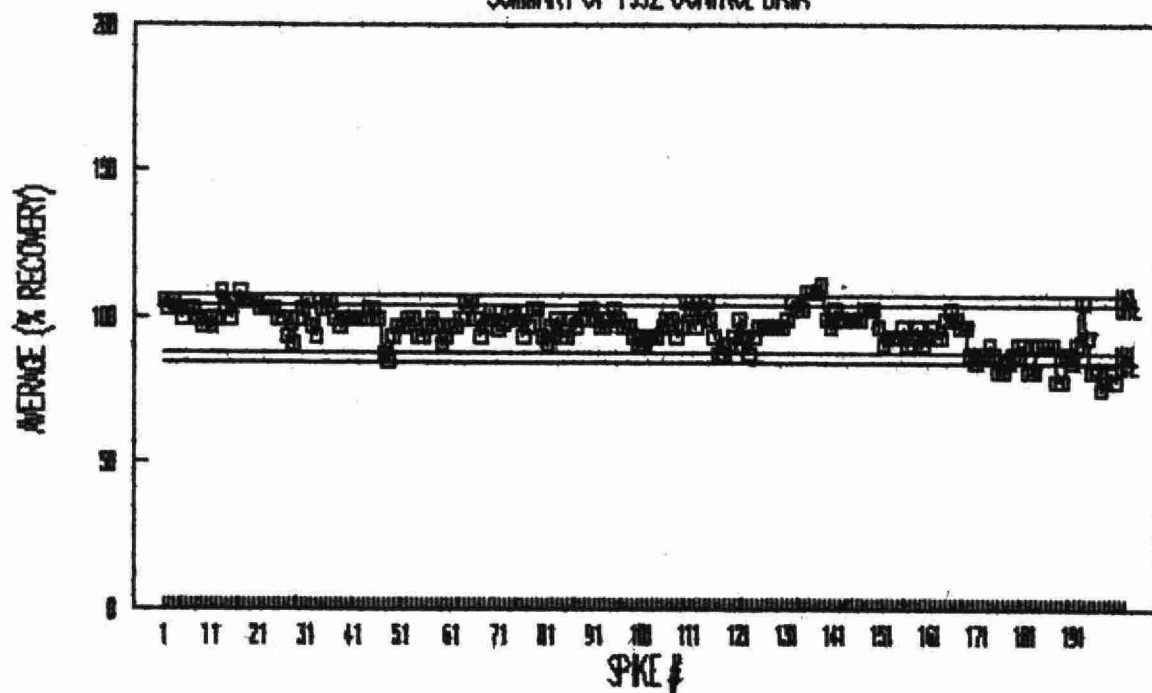
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SUMMARY OF 1992 CONTROL DATA



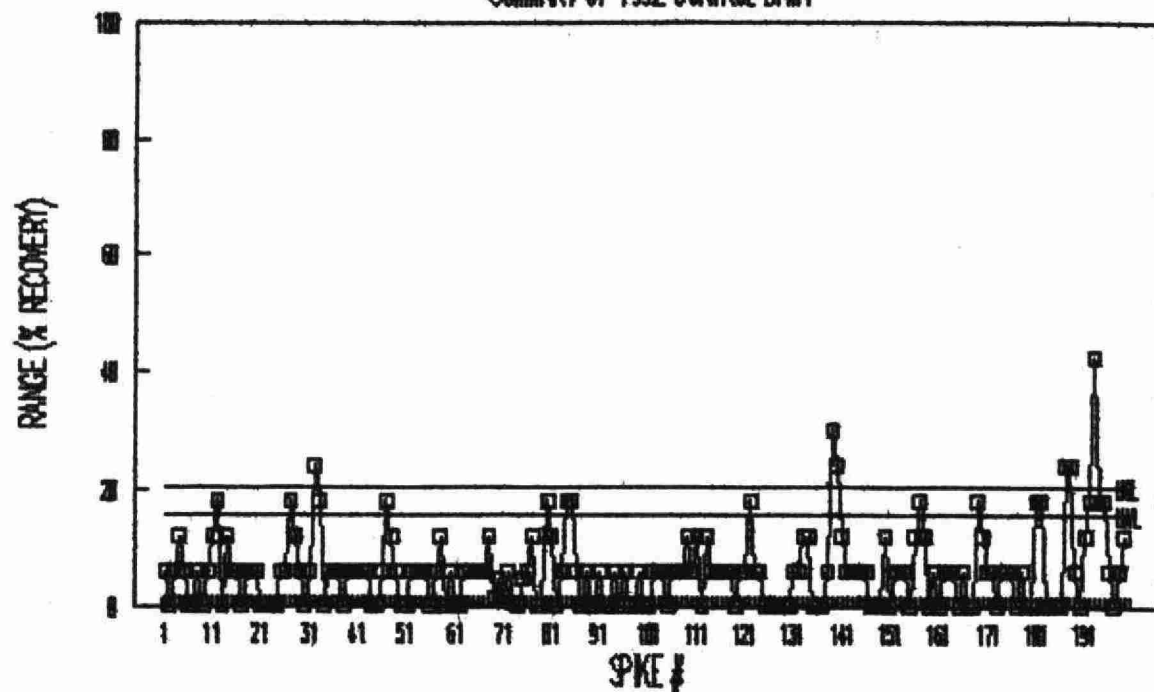
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SUMMARY OF 1992 CONTROL DATA



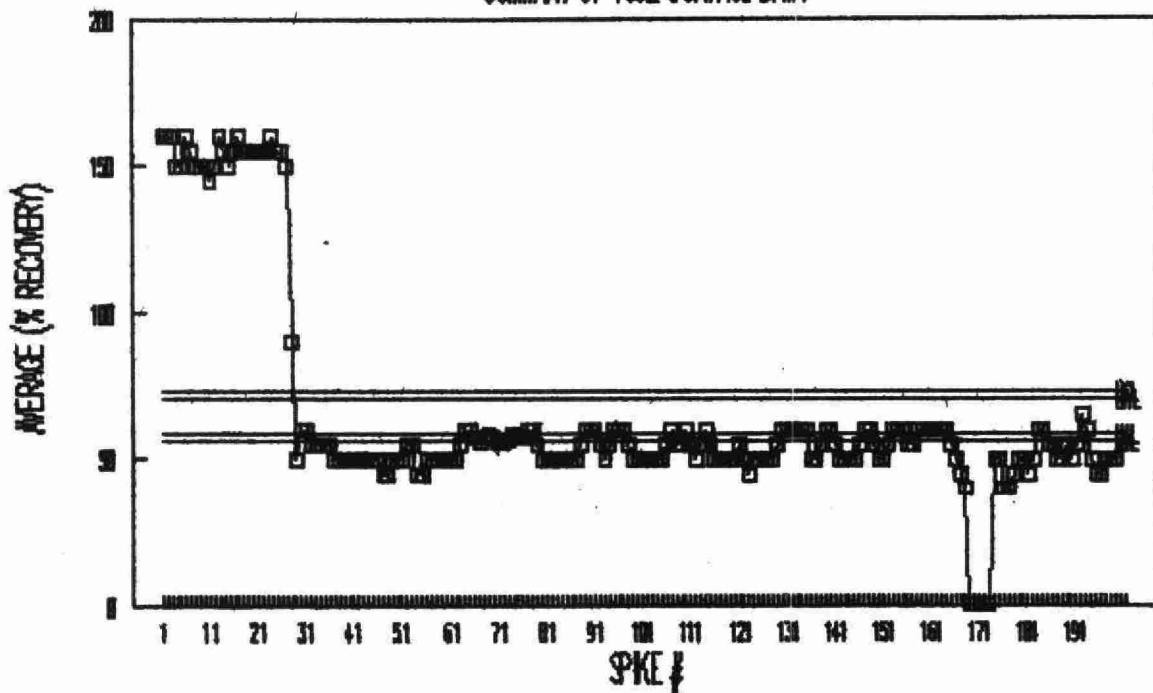
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SUMMARY OF 1992 CONTROL DATA



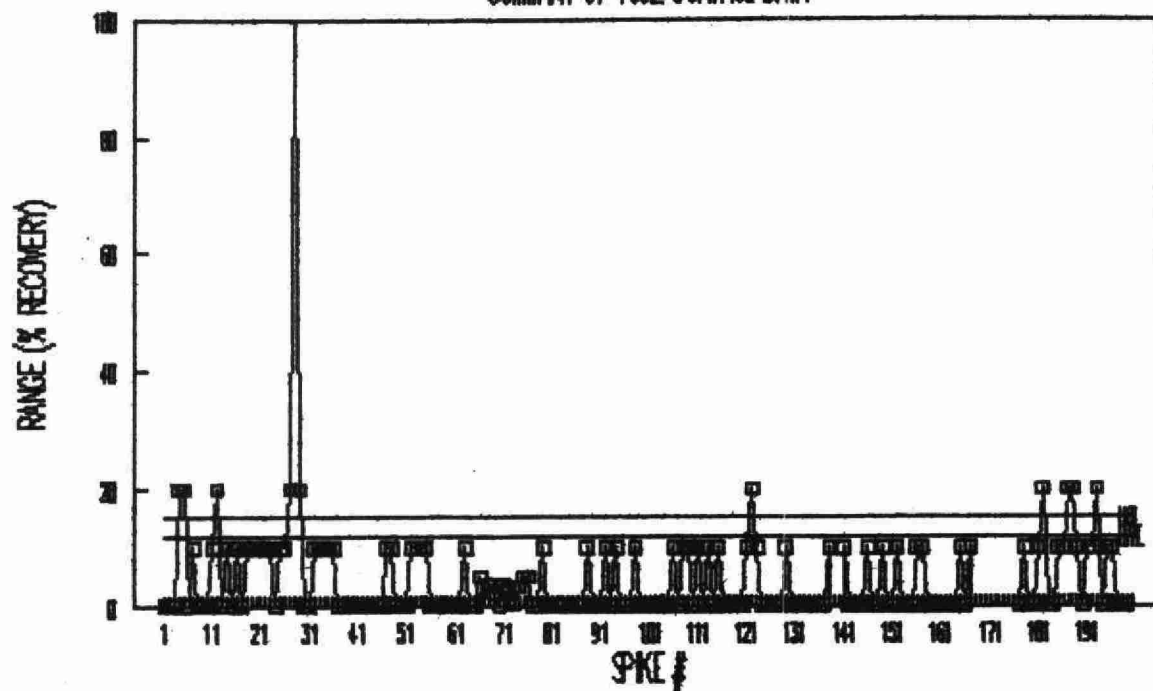
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SUMMARY OF 1992 CONTROL DATA



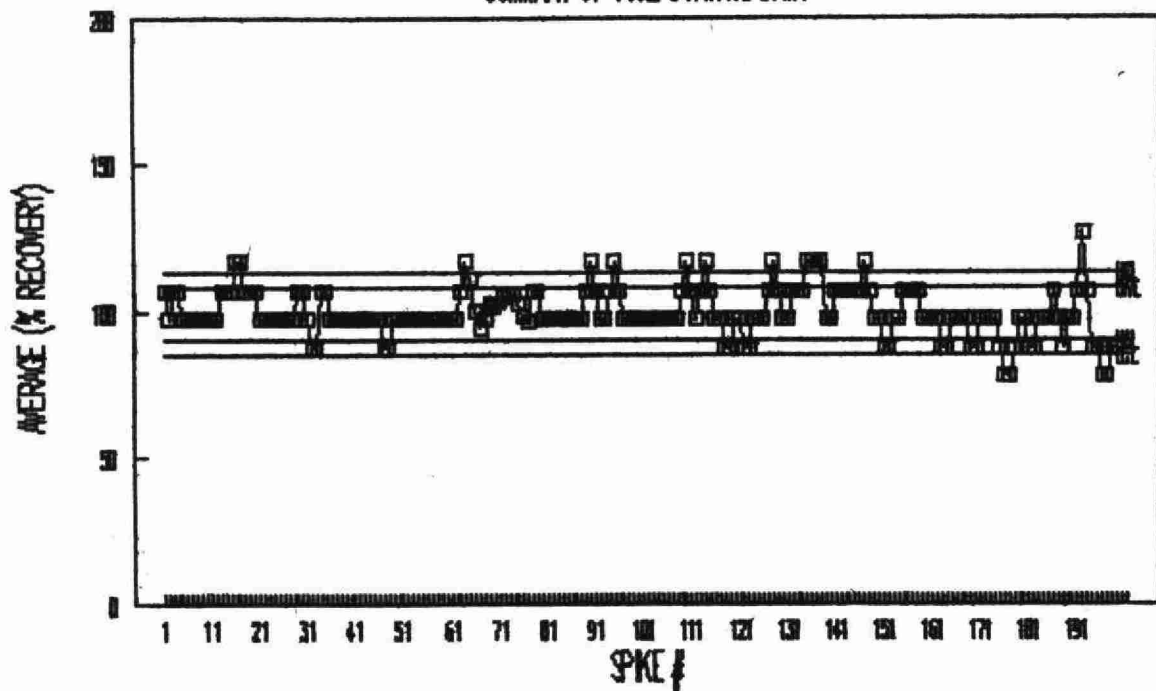
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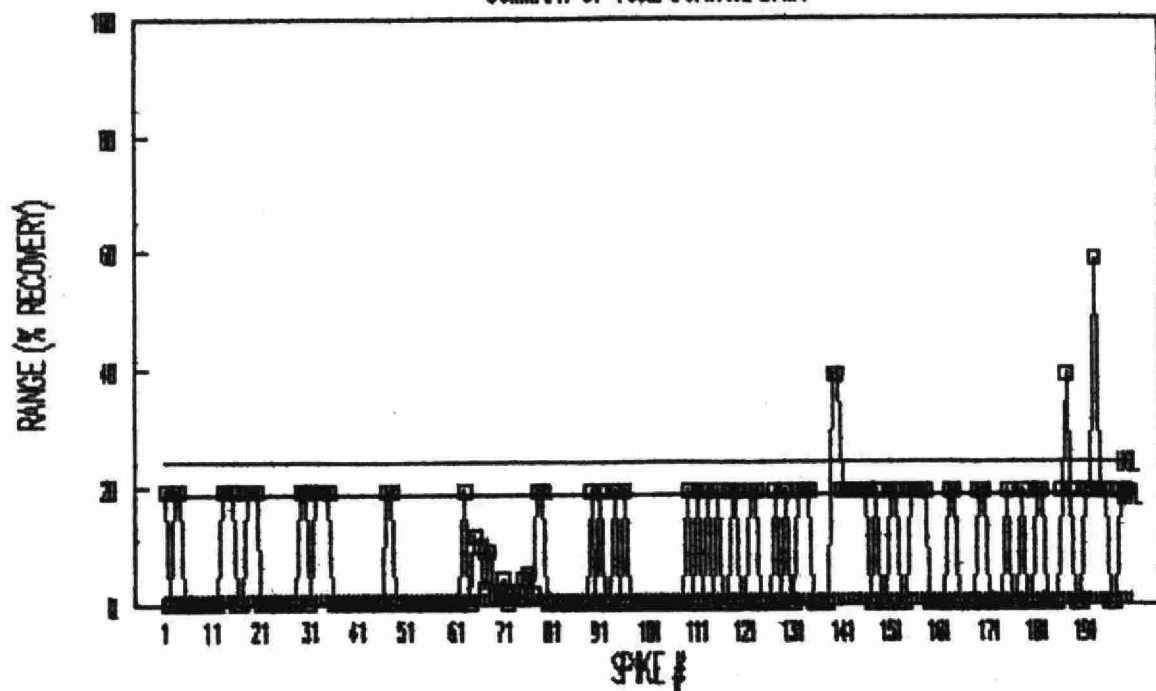
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SUMMARY OF 1992 CONTROL DATA



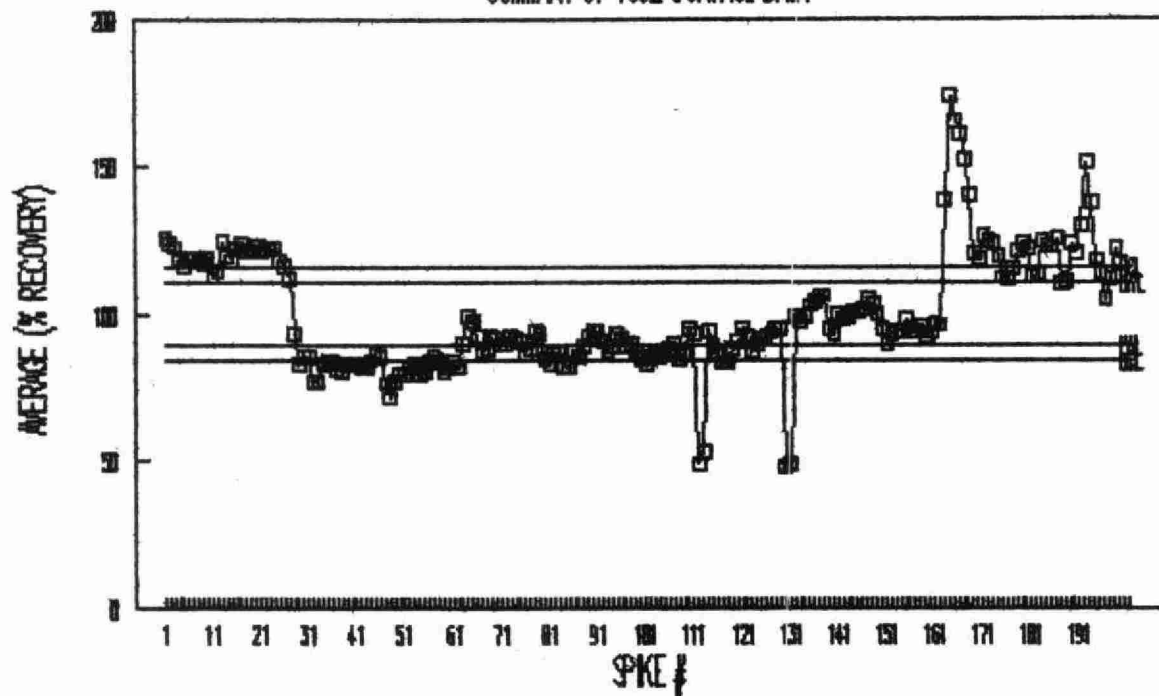
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SUMMARY OF 1992 CONTROL DATA



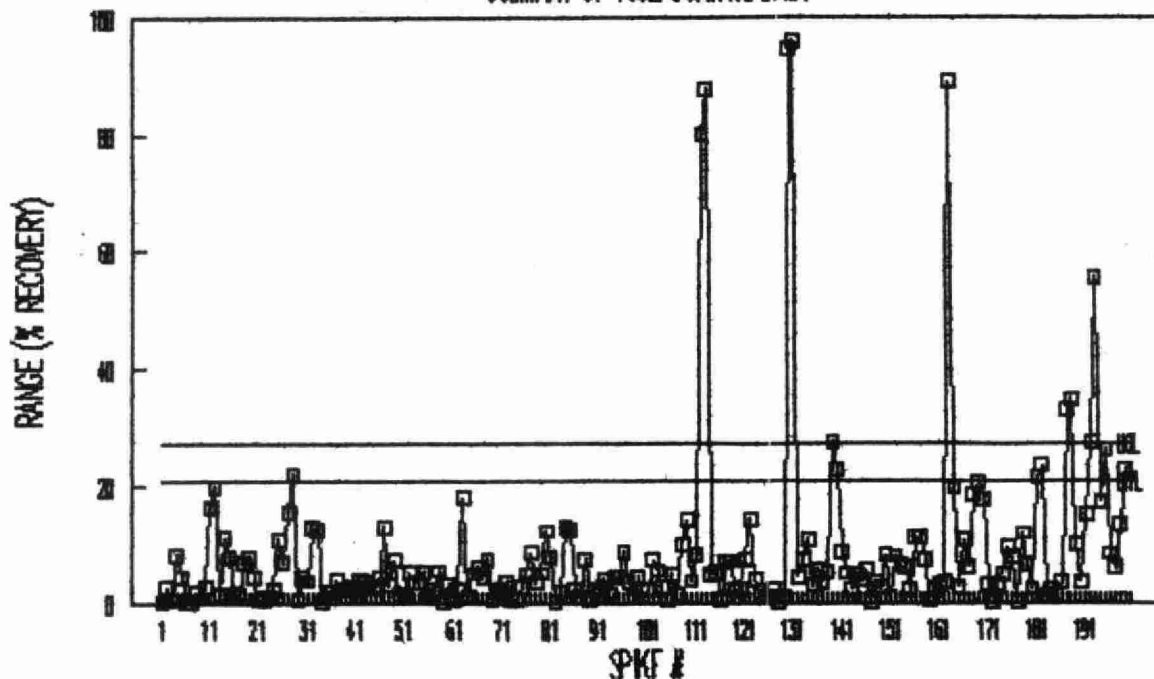
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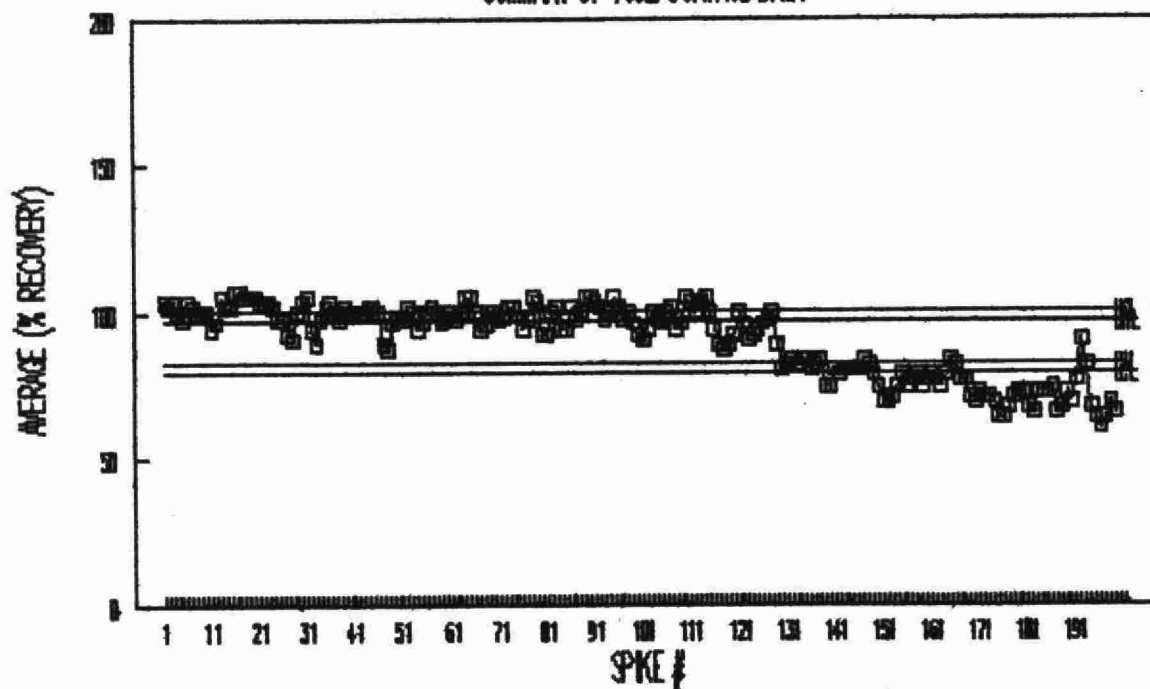
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SUMMARY OF 1992 CONTROL DATA



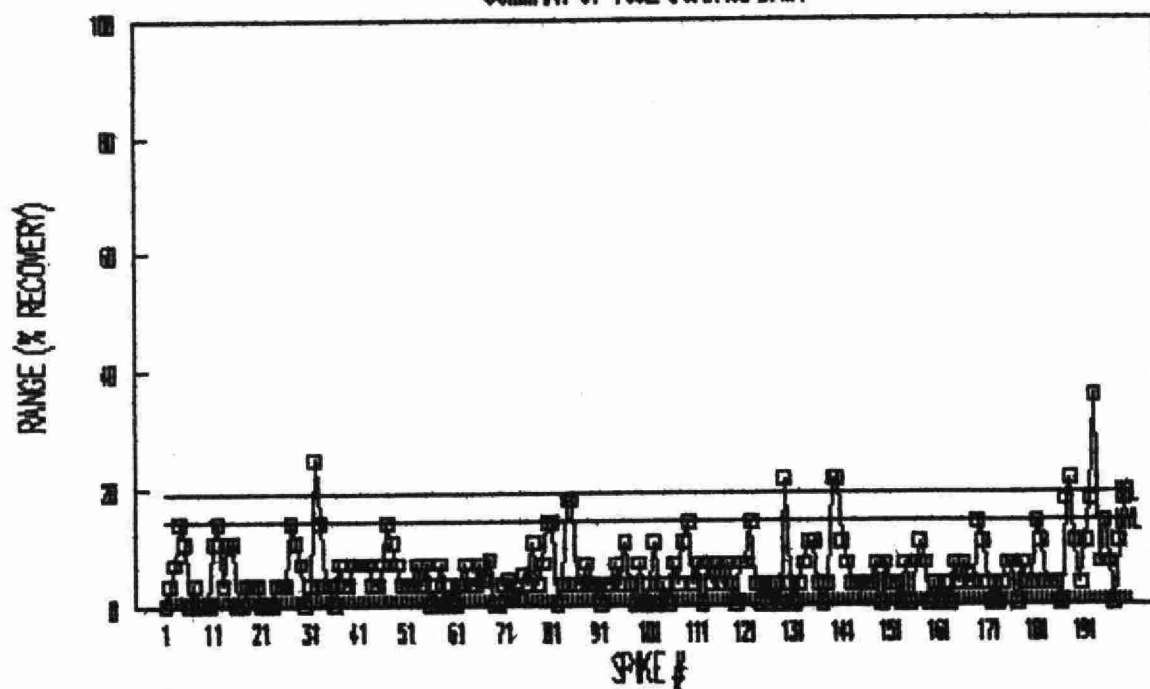
MSAVOL:C13DCP (fid)

SUMMARY OF 1992 CONTROL DATA



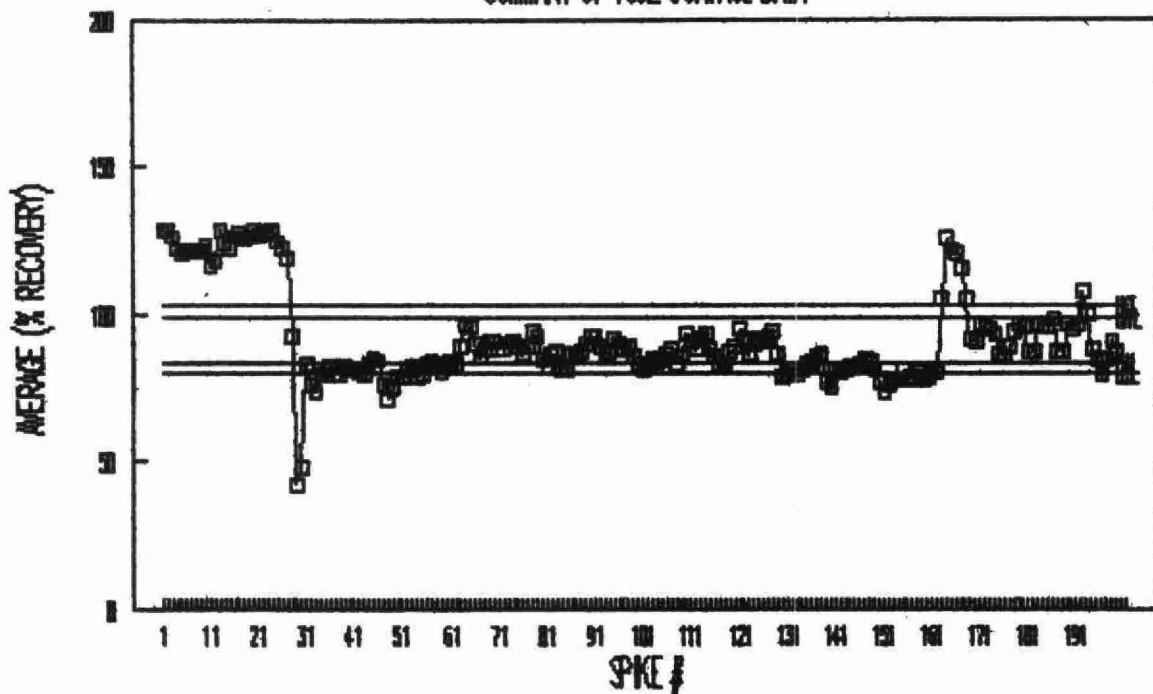
MSAVOL:C13DCP (fid)

SUMMARY OF 1992 CONTROL DATA



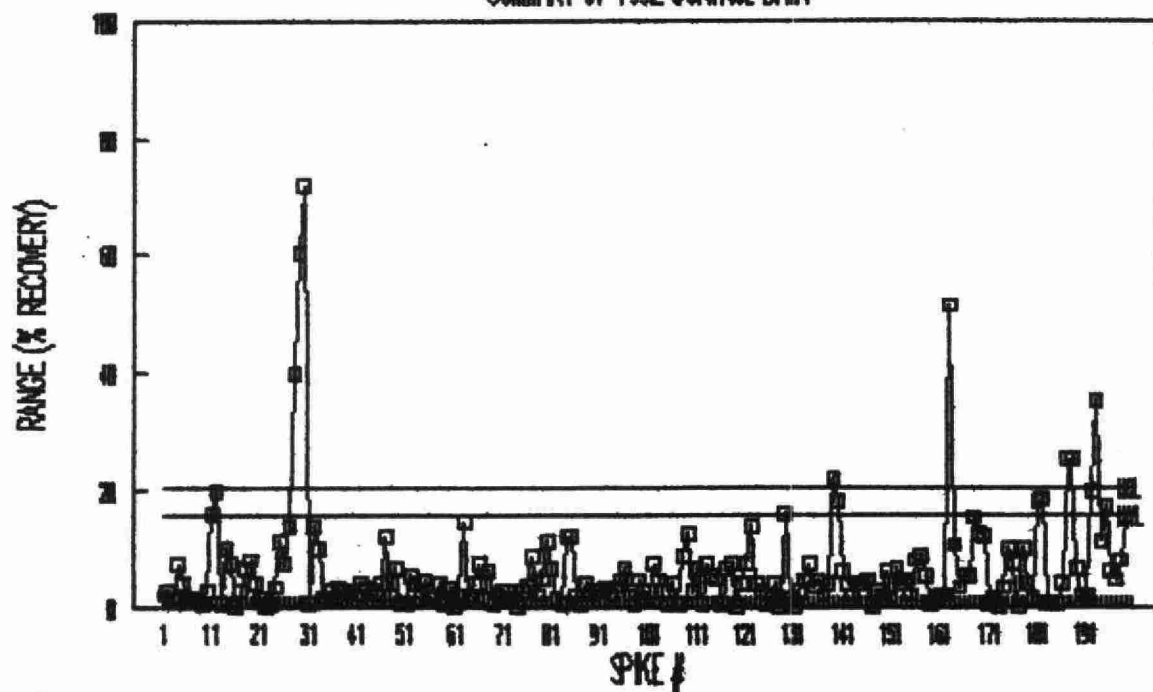
MSAVOL:C13DCP (ecd)

SUMMARY OF 1992 CONTROL DATA



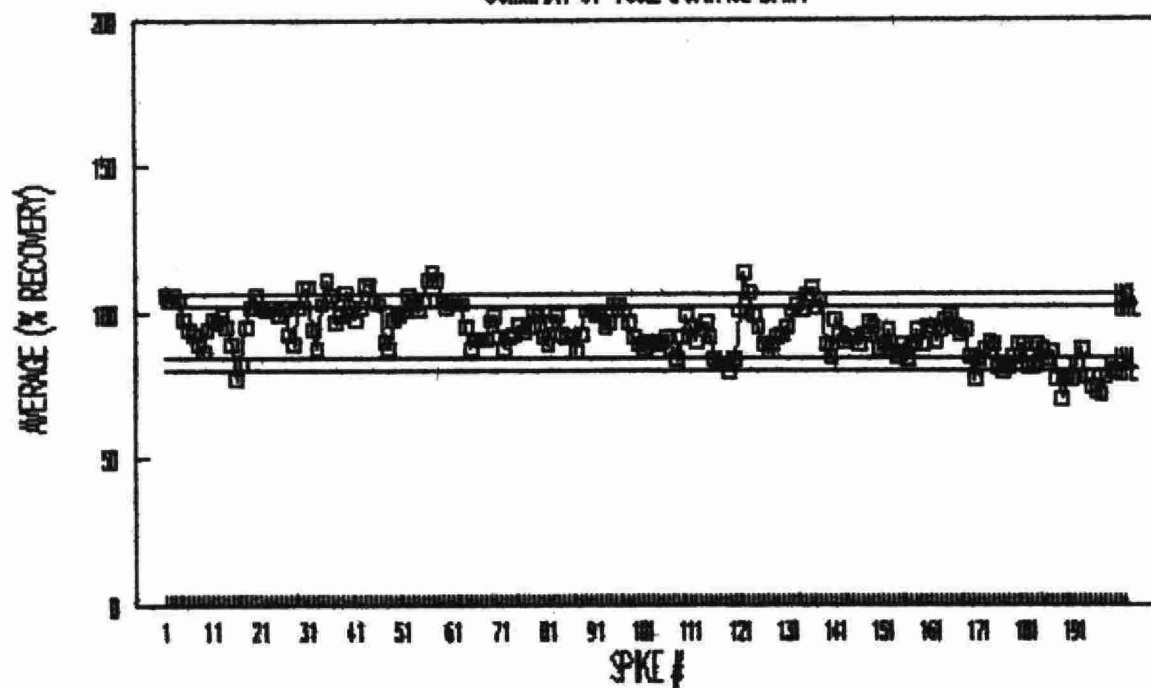
MSAVOL:C13DCP (ecd)

SUMMARY OF 1992 CONTROL DATA



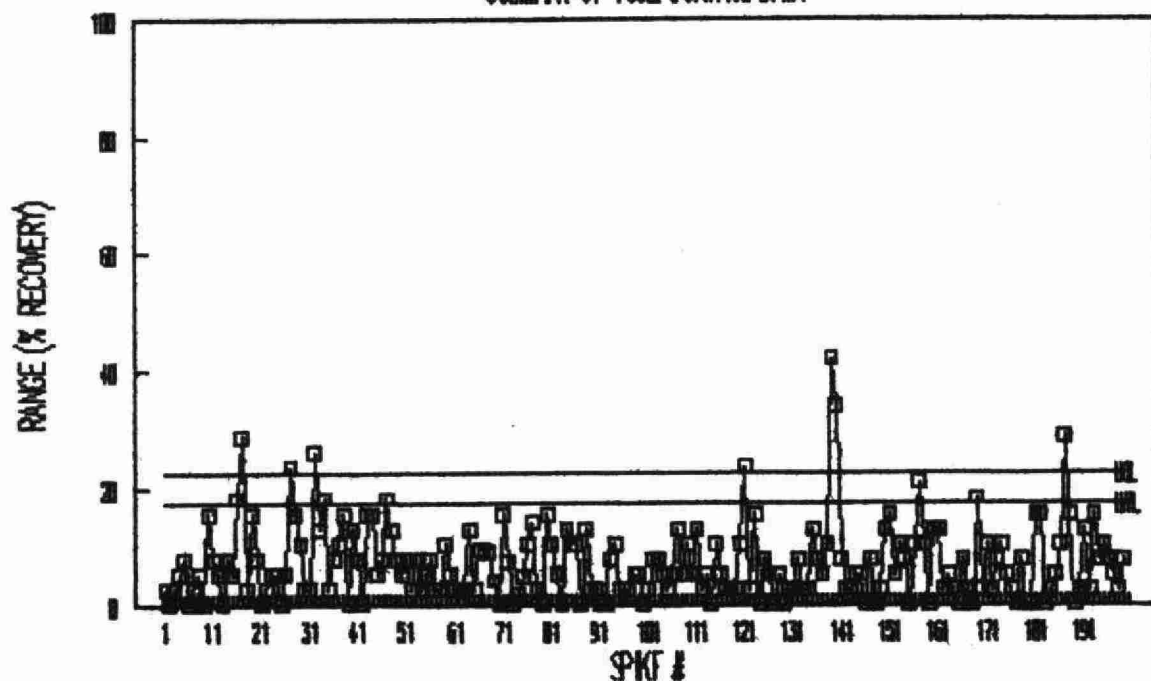
MSAVOL:D8-TOL (fid)

SUMMARY OF 1992 CONTROL DATA



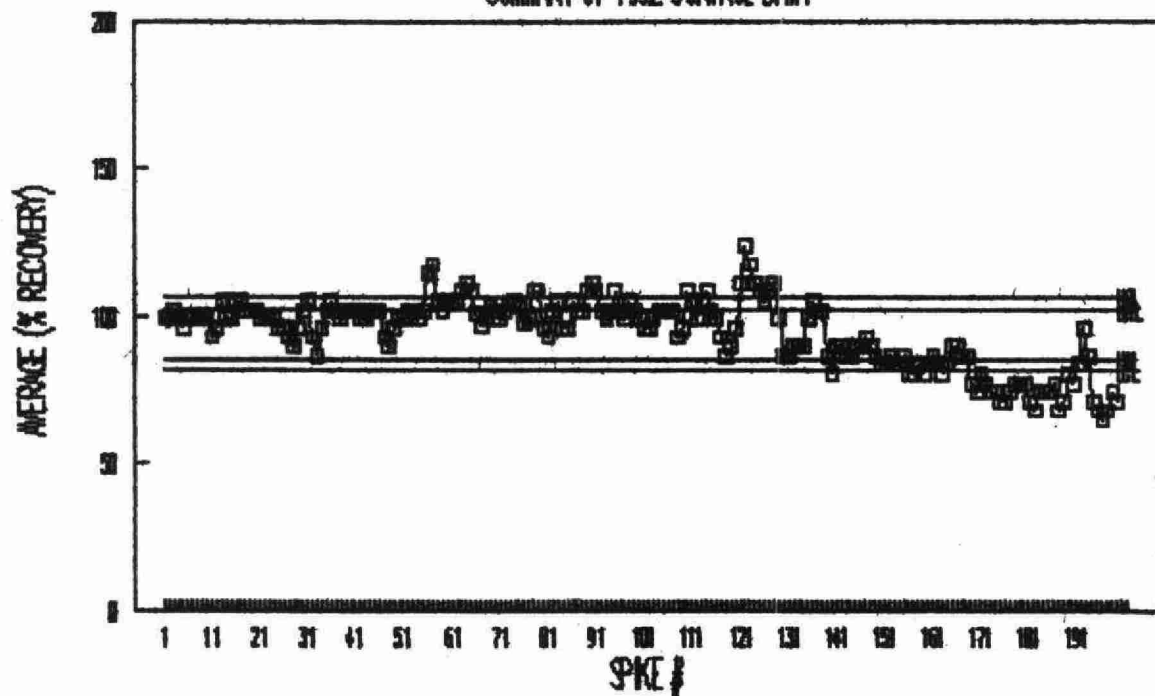
MSAVOL:D8-TOL (fid)

SUMMARY OF 1992 CONTROL DATA



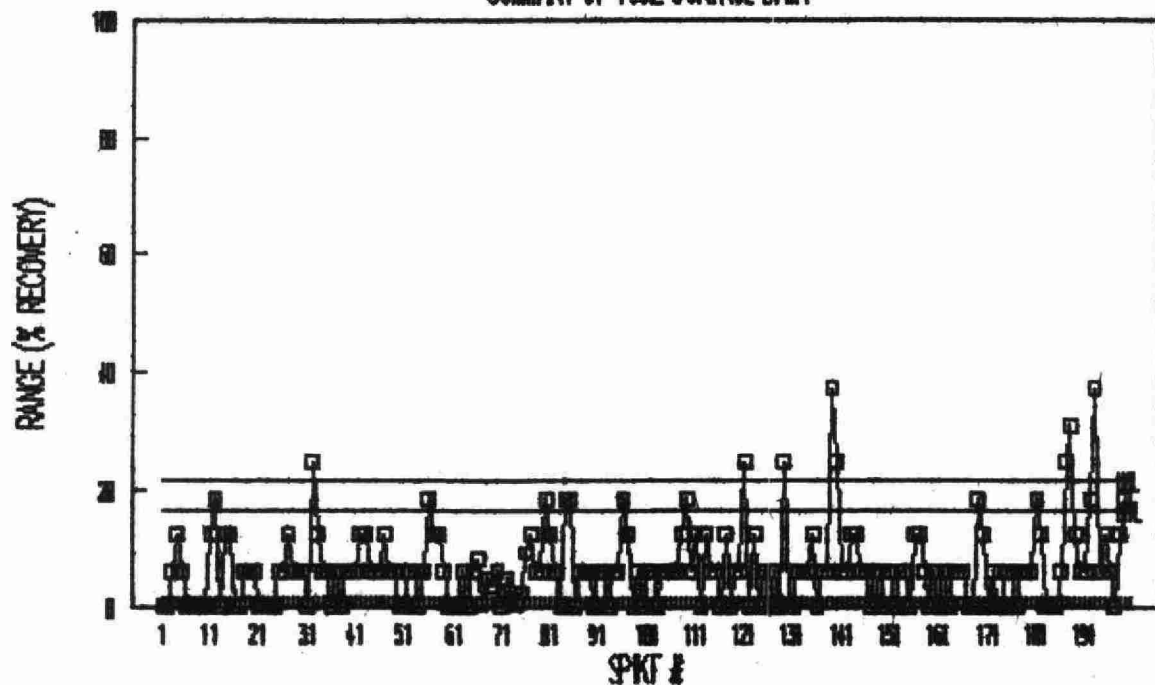
MSAVOL:T13DCP (fid)

SUMMARY OF 1992 CONTROL DATA



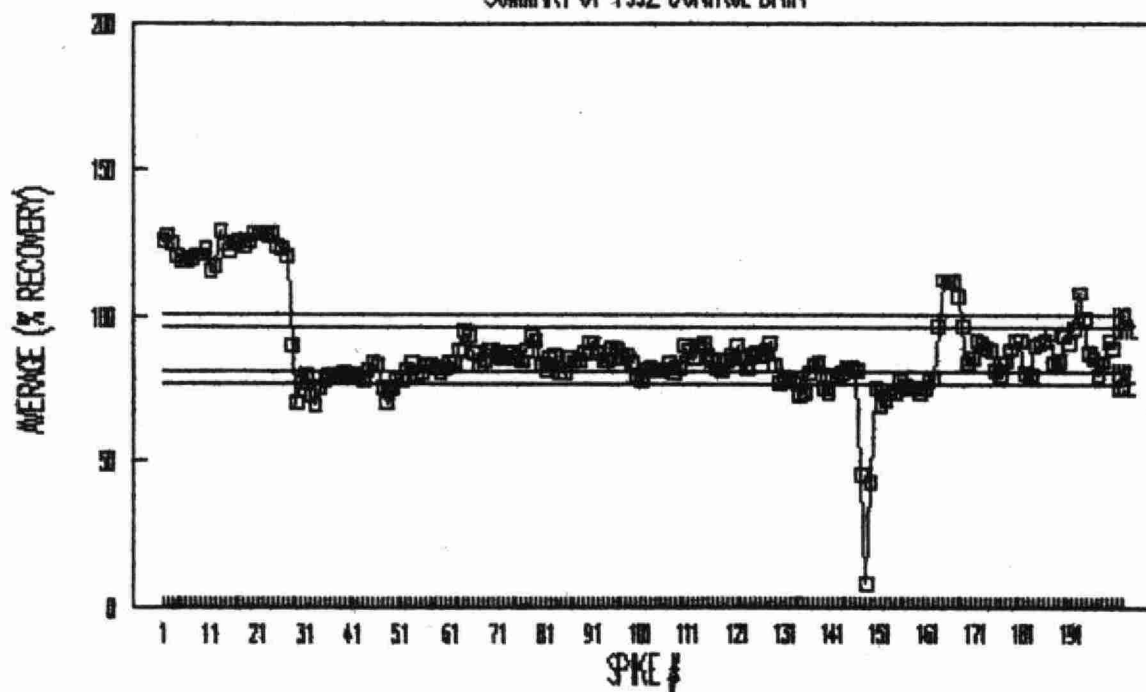
MSAVOL:T13DCP (fid)

SUMMARY OF 1992 CONTROL DATA



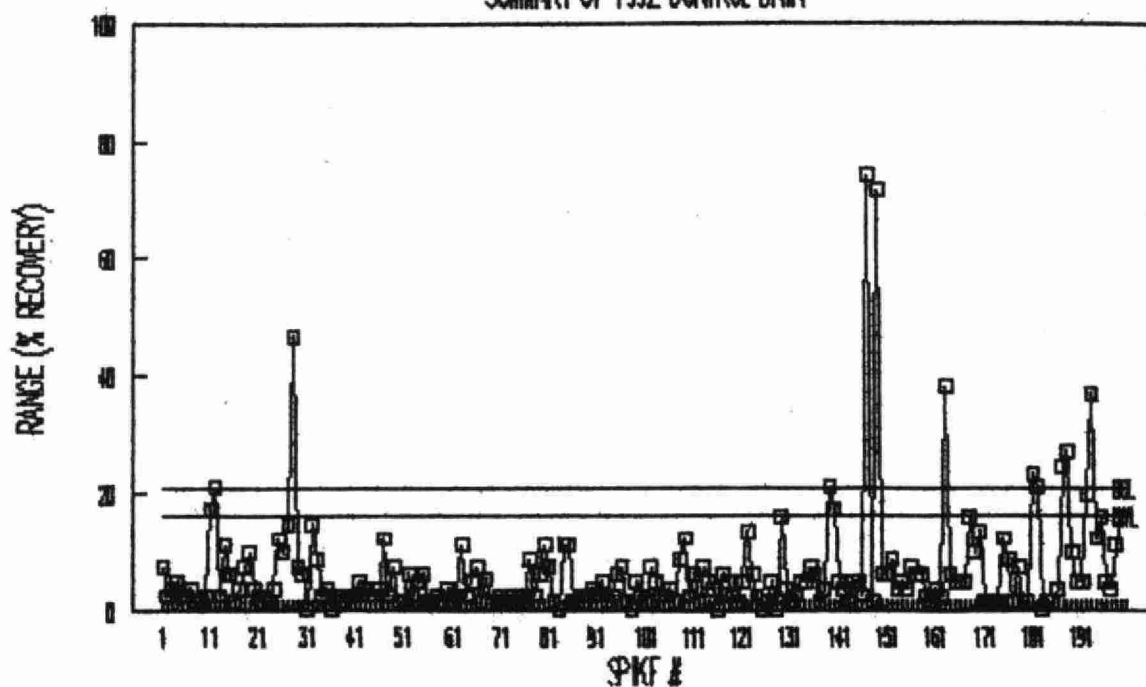
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SUMMARY OF 1992 CONTROL DATA



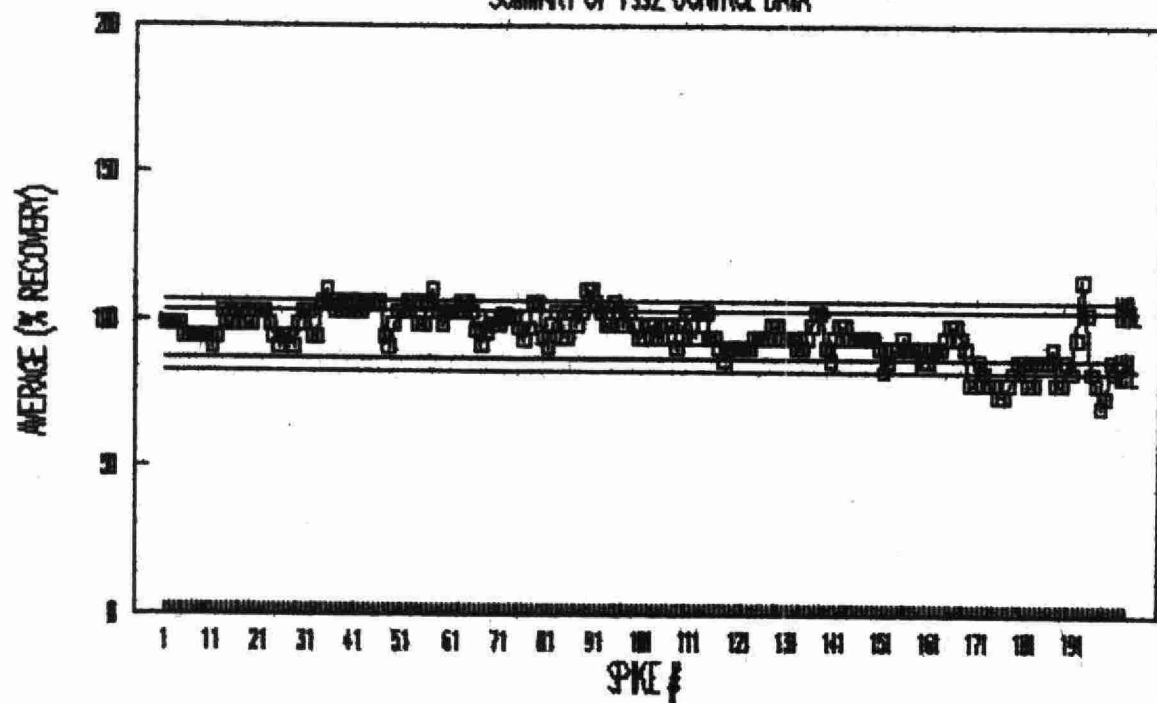
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SUMMARY OF 1992 CONTROL DATA



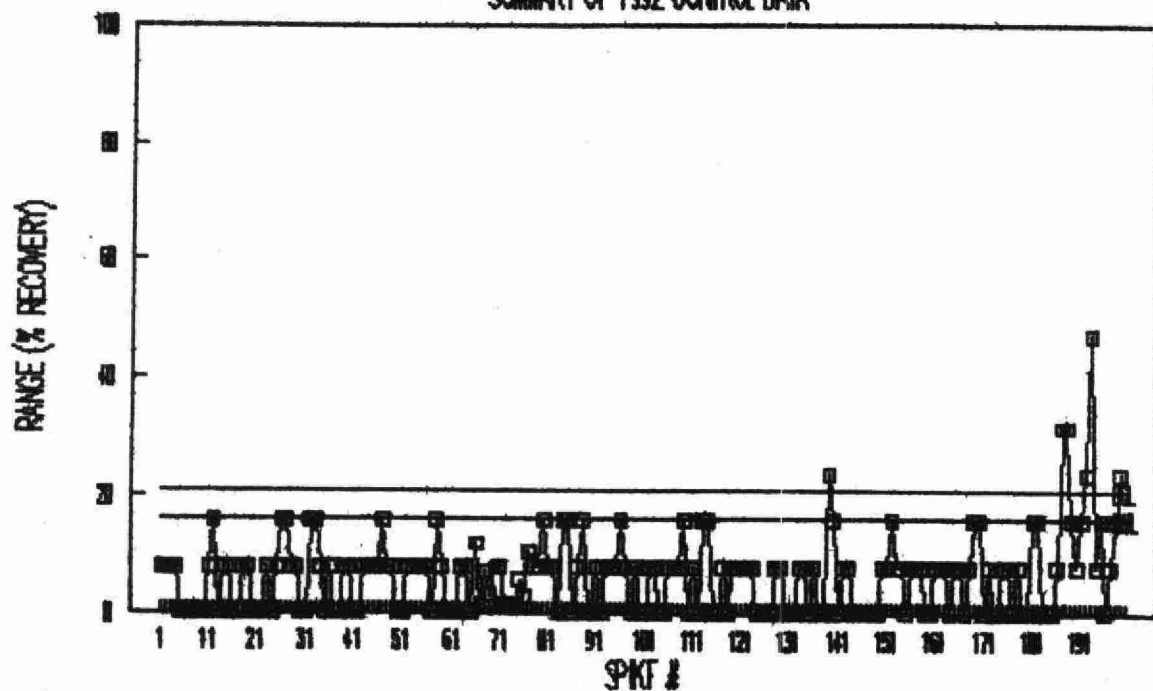
MSAVOL:112T (fid)

SUMMARY OF 1992 CONTROL DATA



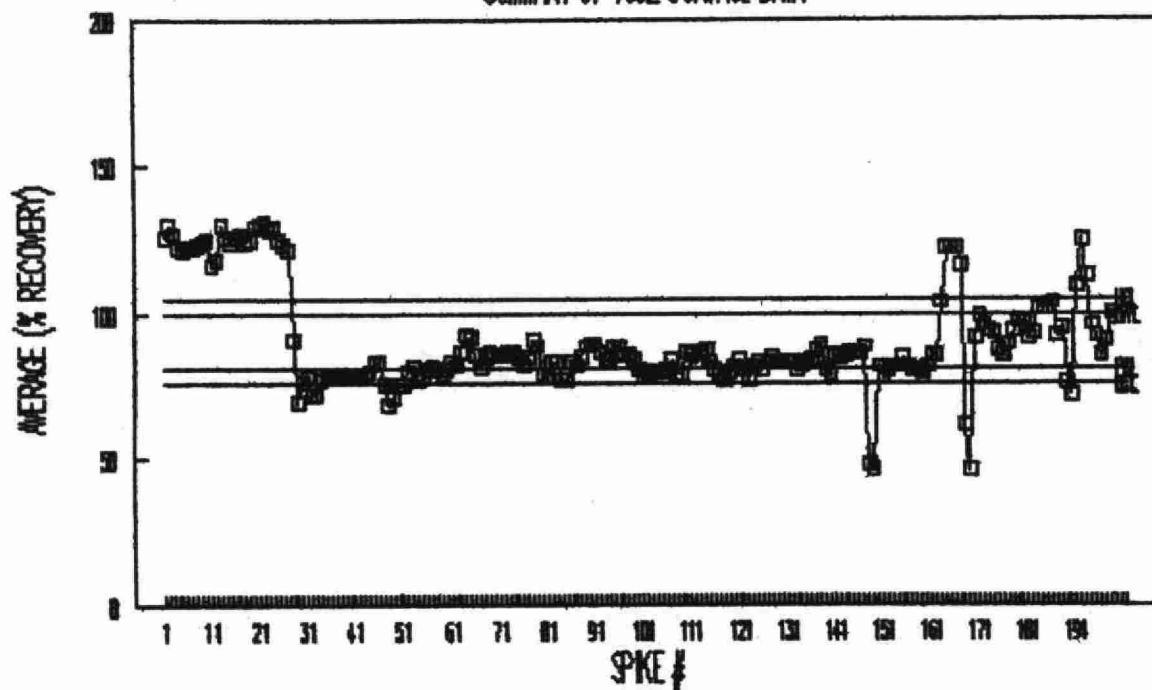
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SUMMARY OF 1992 CONTROL DATA



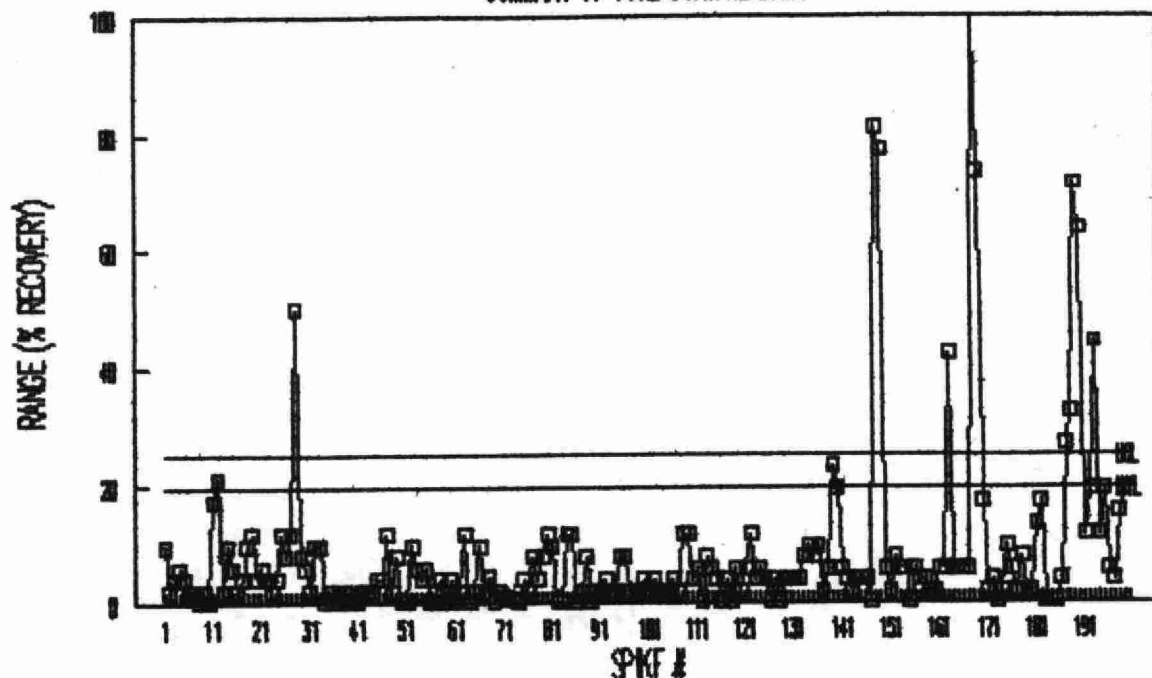
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SUMMARY OF 1992 CONTROL DATA



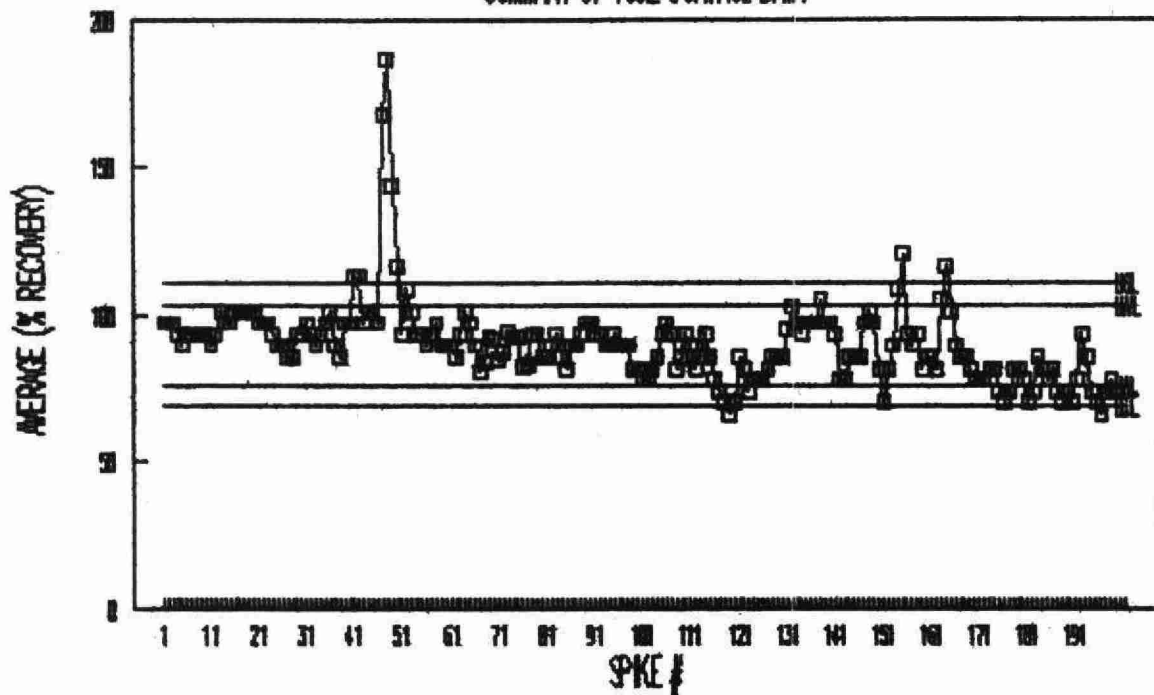
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SUMMARY OF 1992 CONTROL DATA



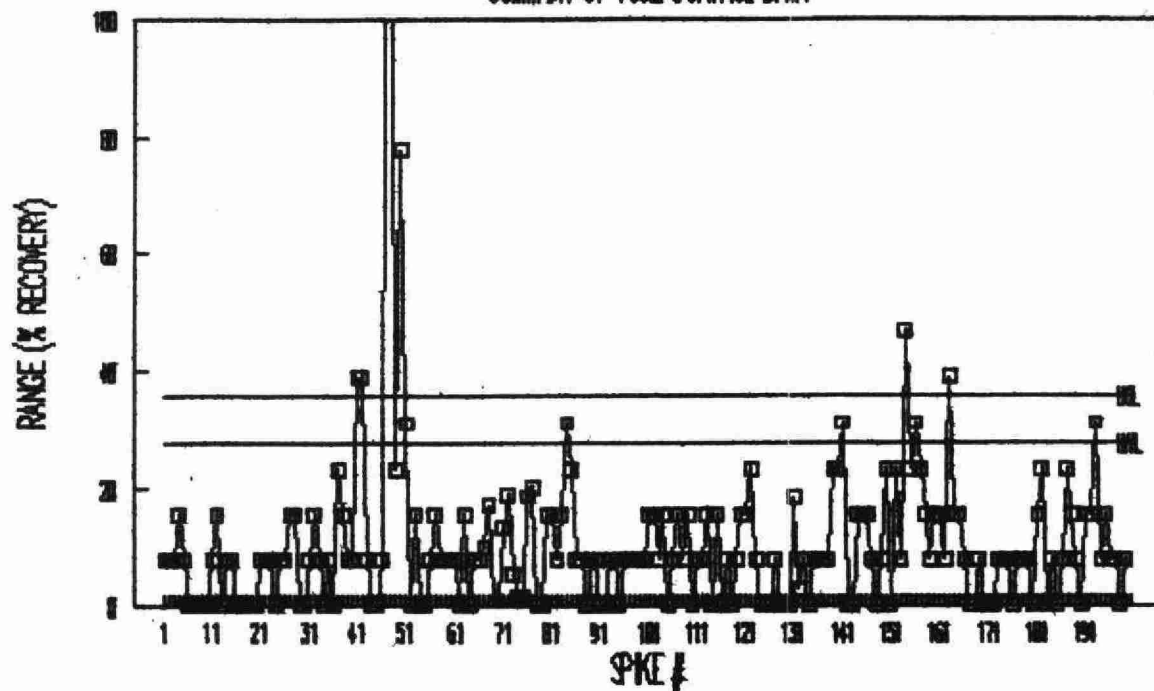
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SUMMARY OF 1992 CONTROL DATA



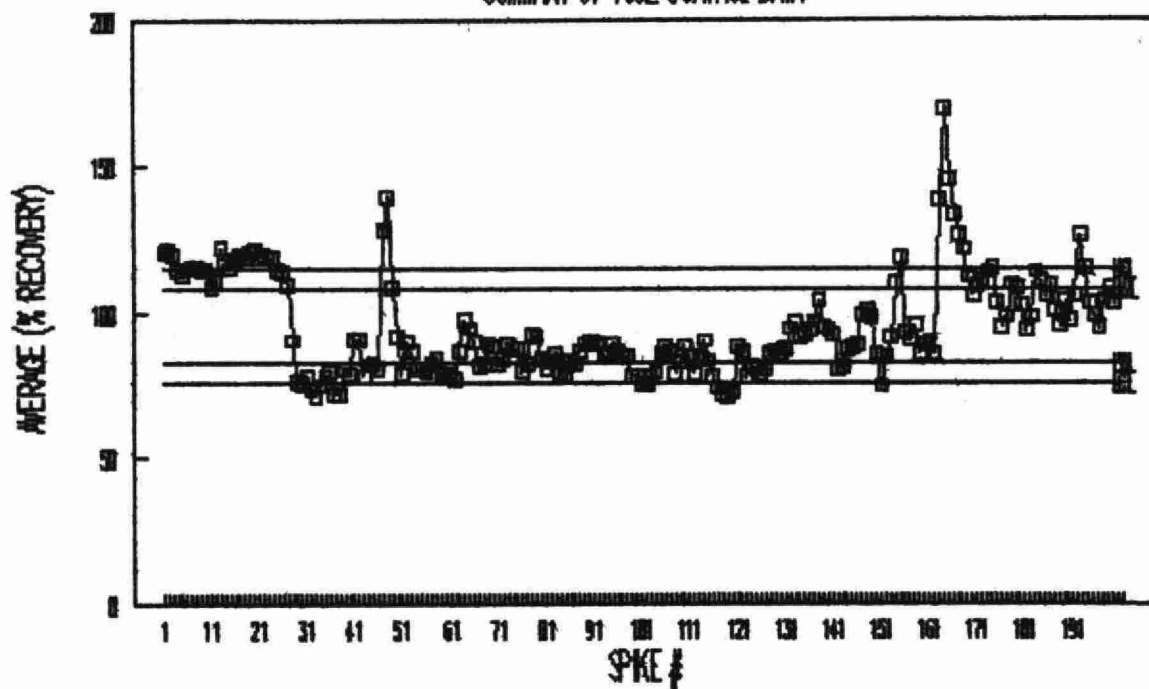
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SUMMARY OF 1992 CONTROL DATA



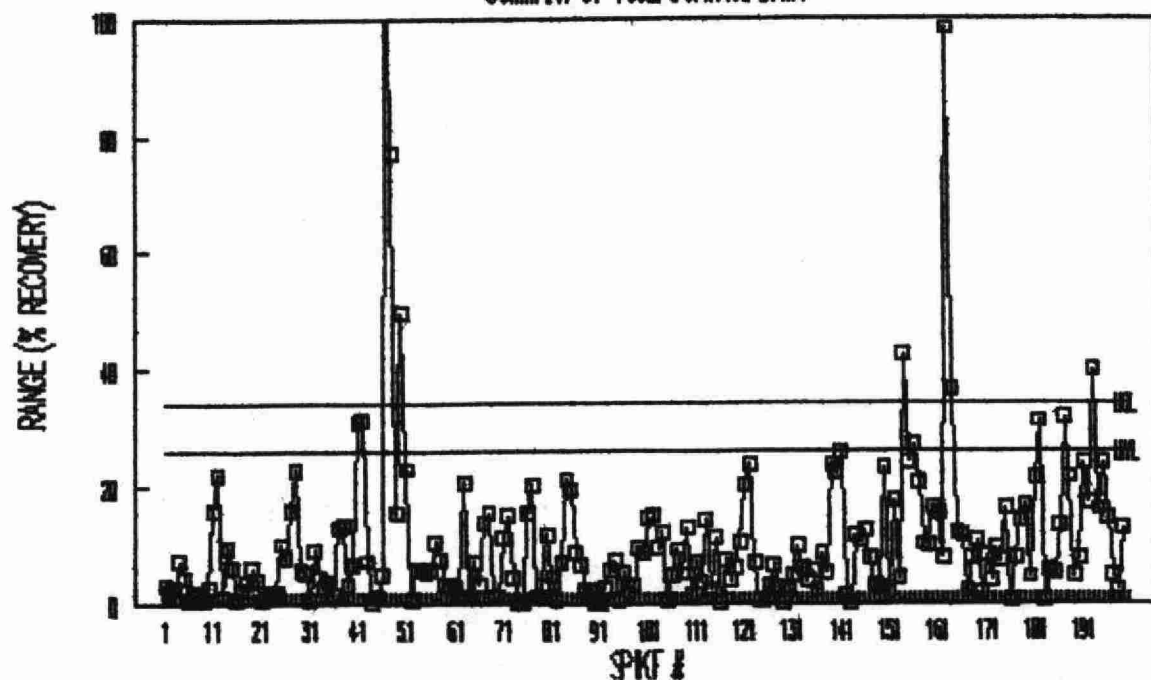
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SUMMARY OF 1992 CONTROL DATA



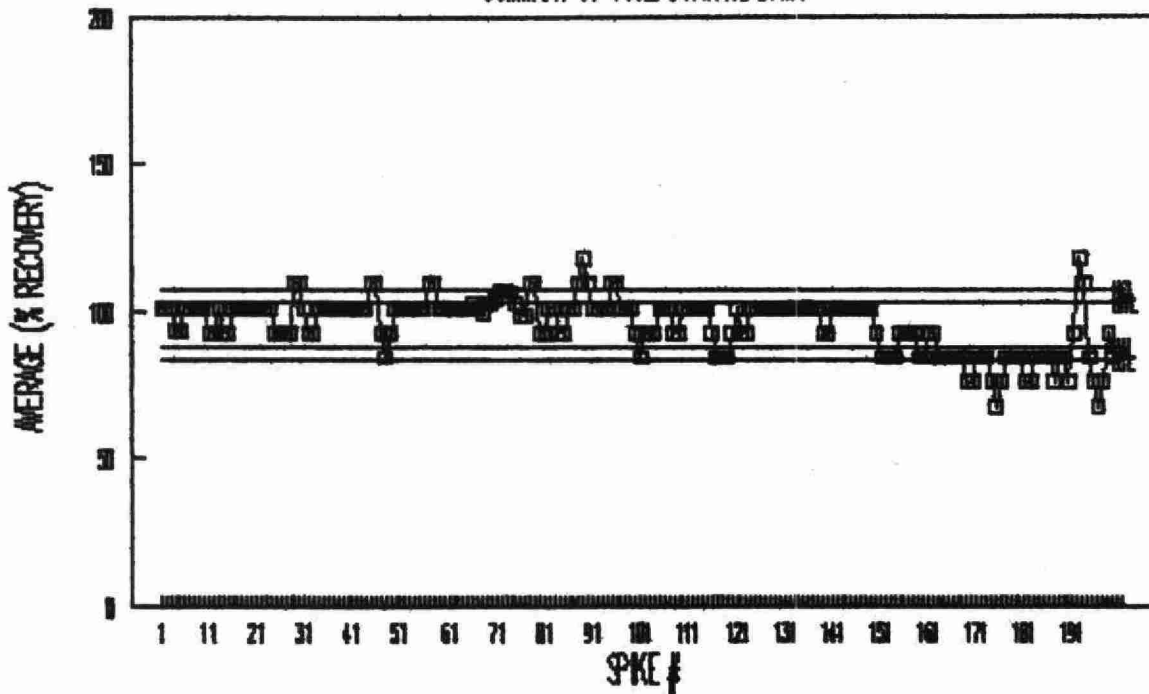
MSAVOL:TETRA (ecd)

SUMMARY OF 1992 CONTROL DATA



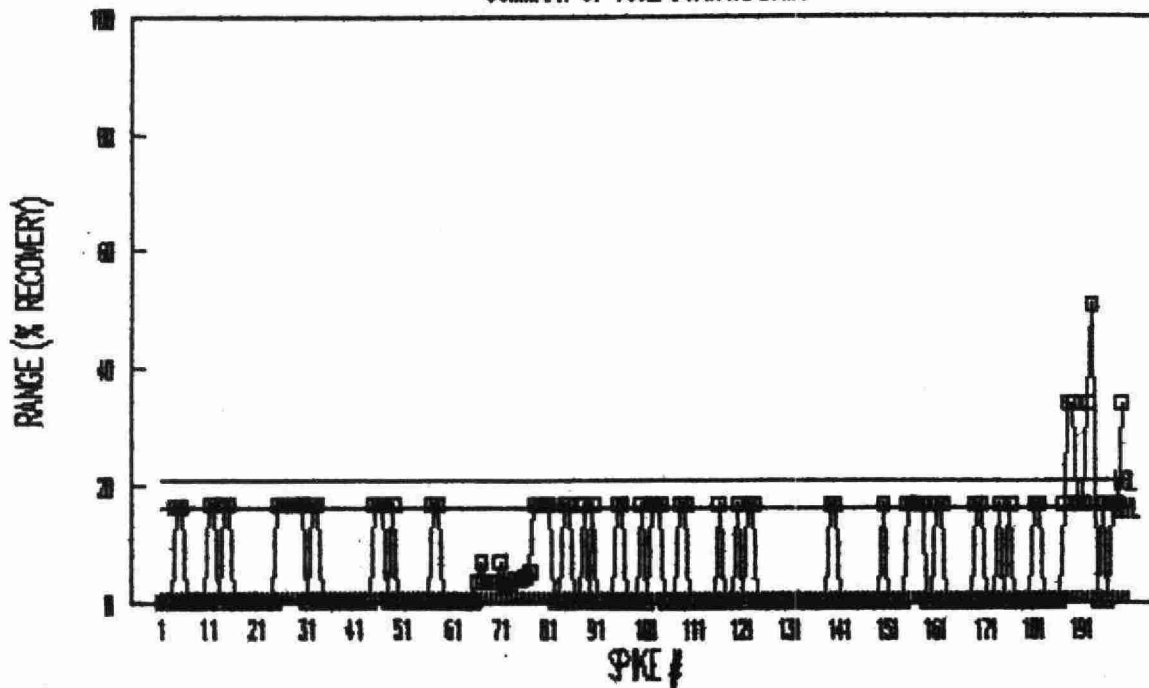
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SUMMARY OF 1992 CONTROL DATA

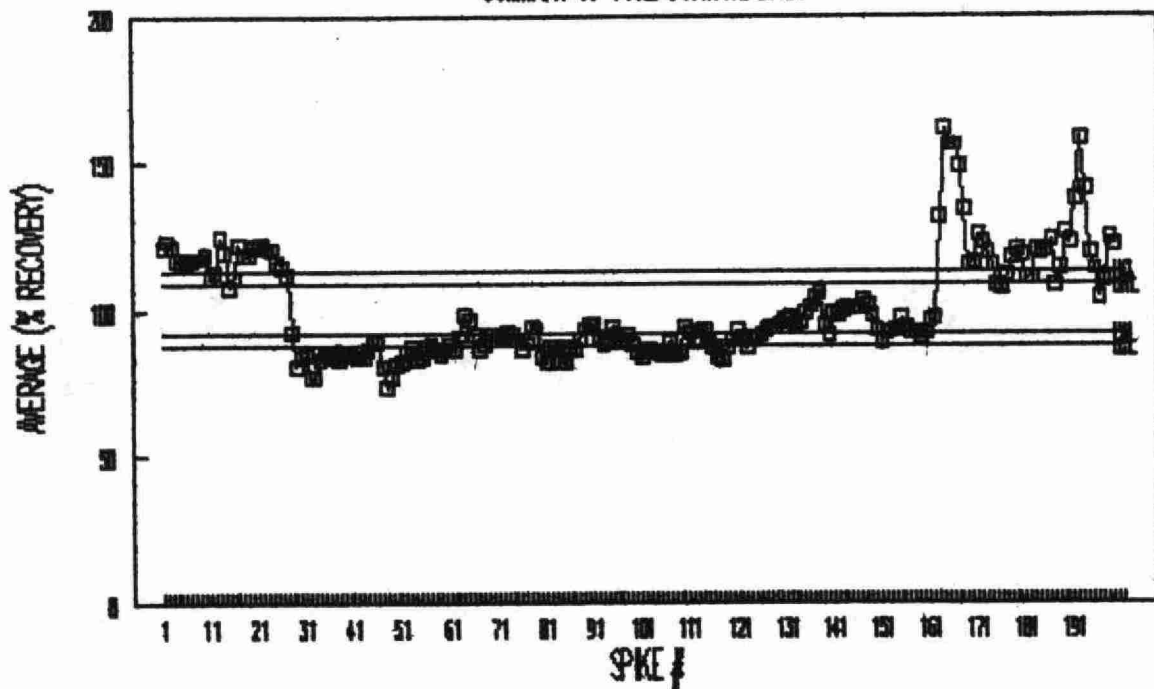


MSAVOL:CDBM (fid)

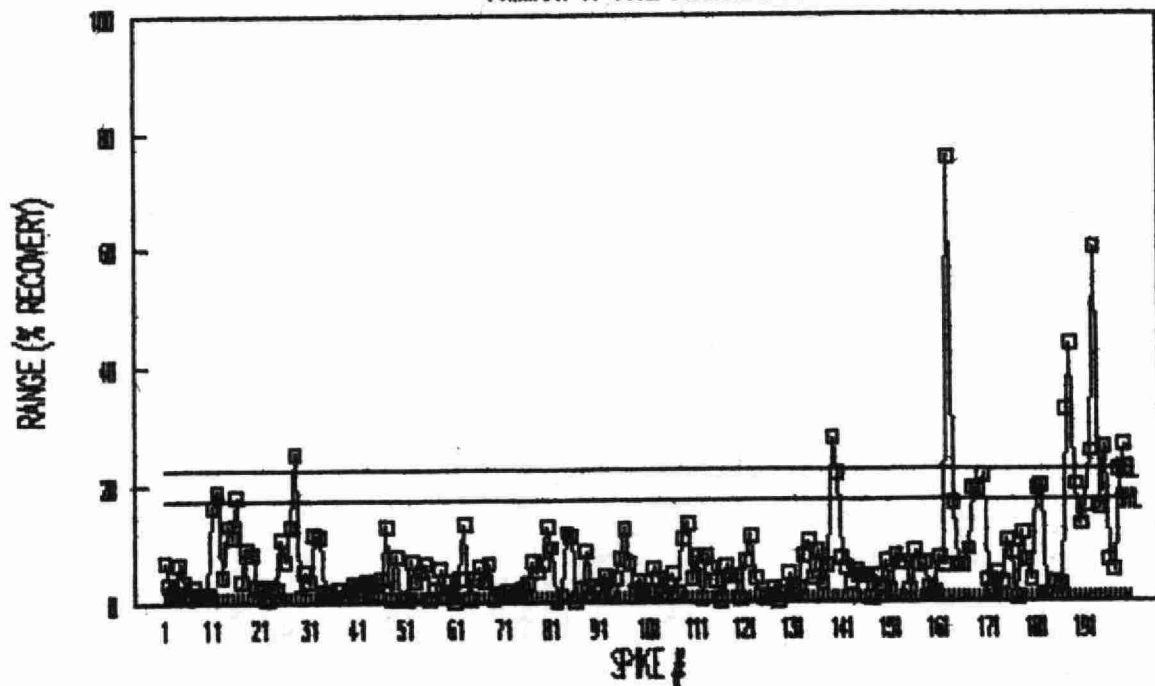
SUMMARY OF 1992 CONTROL DATA



MSAVOL:CDBM (ecd)
SUMMARY OF 1992 CONTROL DATA

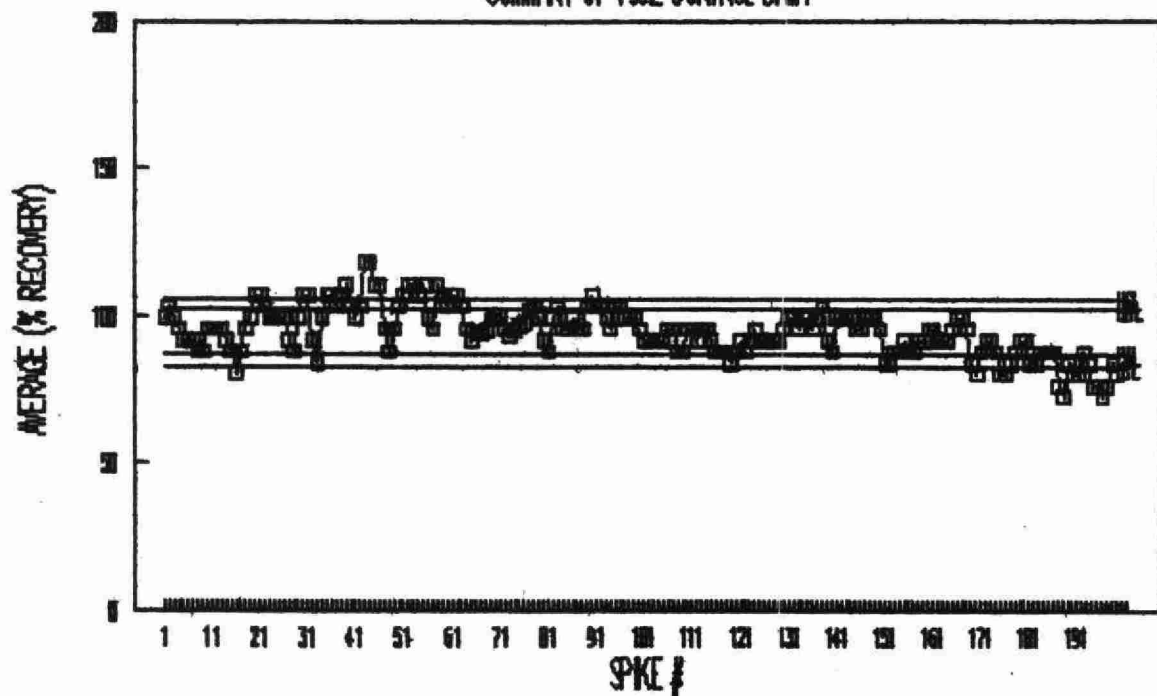


MSAVOL:CDBM (ecd)
SUMMARY OF 1992 CONTROL DATA



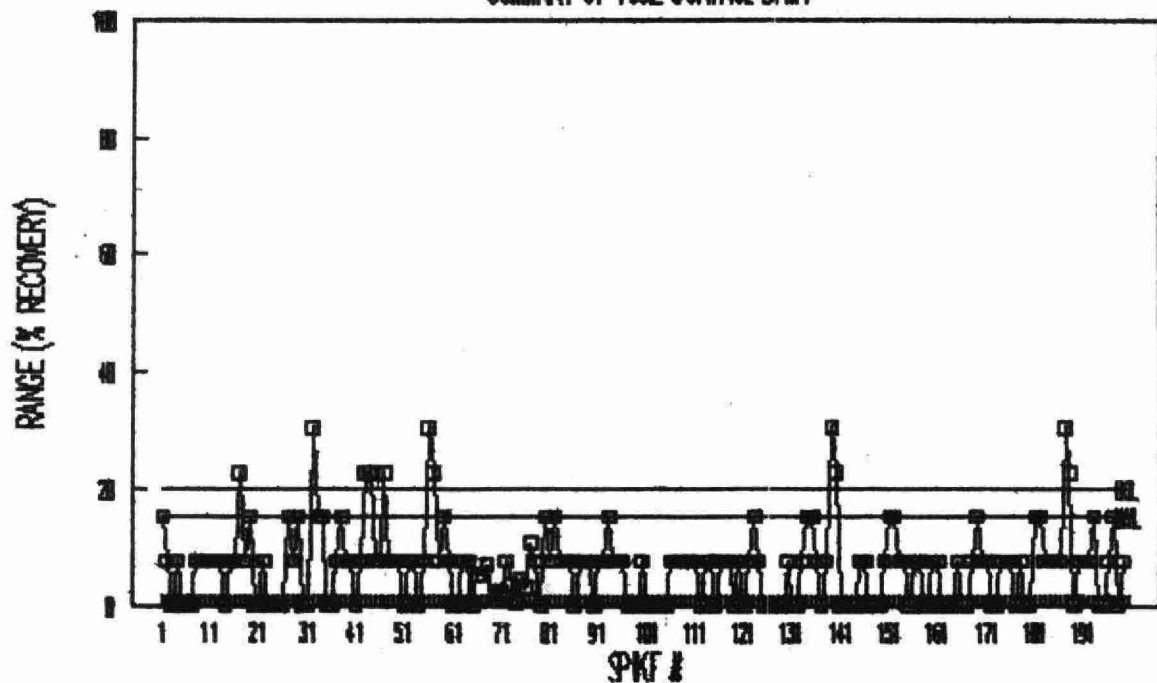
33
MSAVOL:D4-EDB (fid)

SUMMARY OF 1992 CONTROL DATA



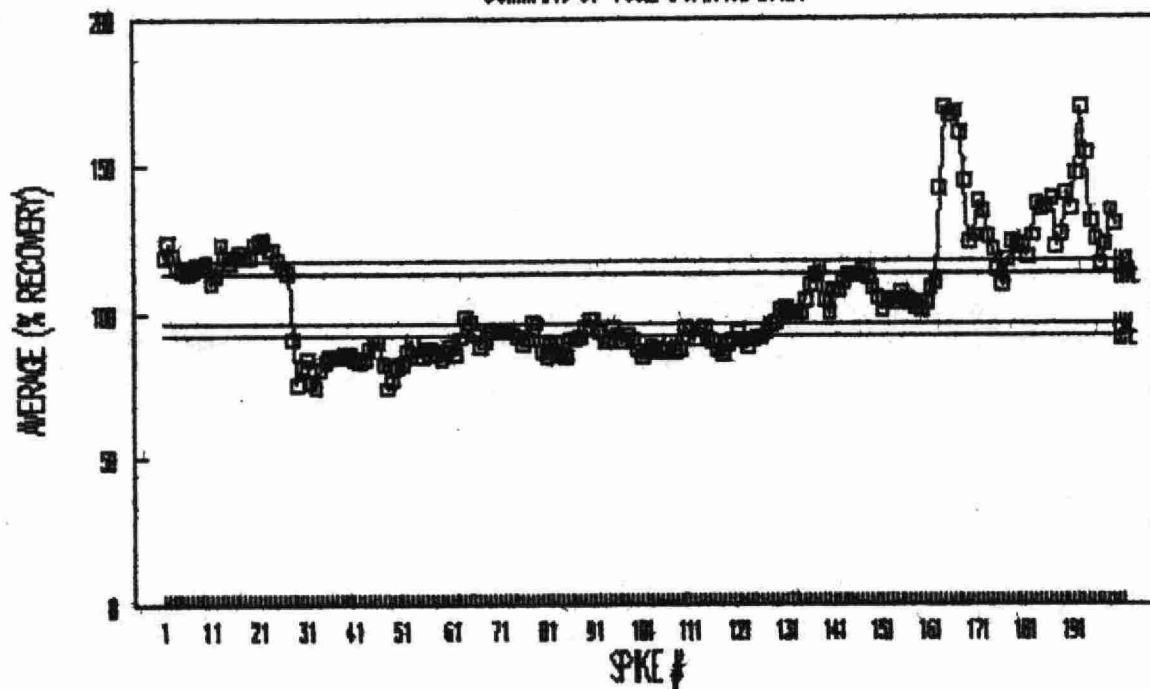
MSAVOL:D4-EDB (fid)

SUMMARY OF 1992 CONTROL DATA



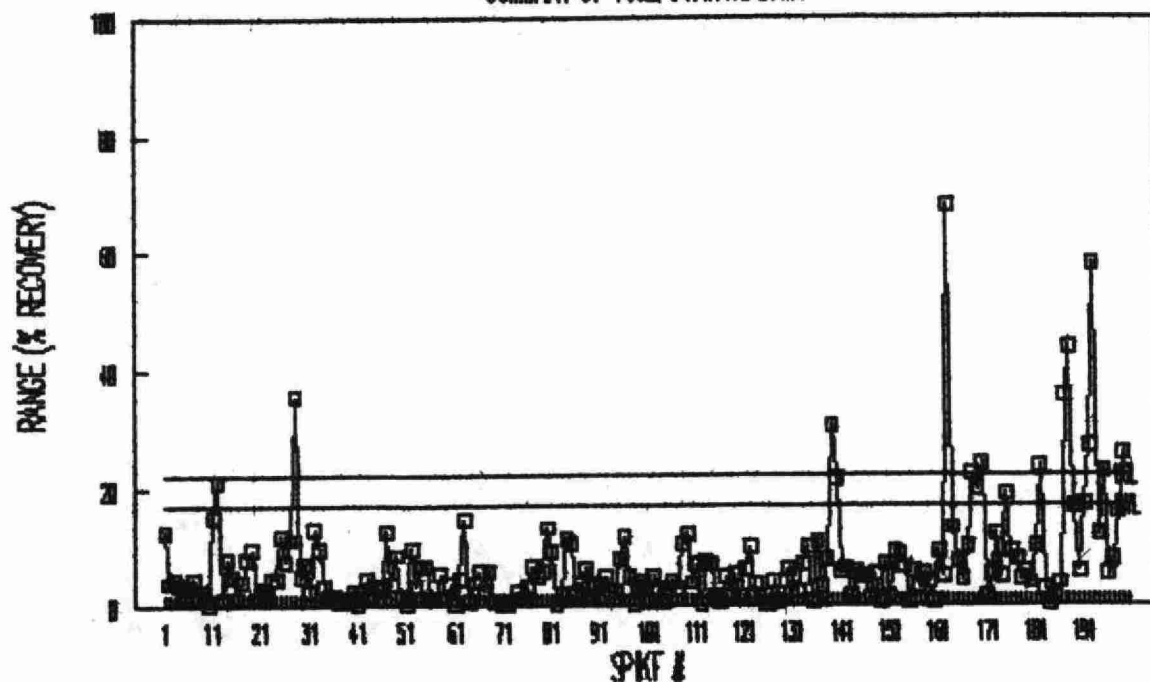
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SUMMARY OF 1992 CONTROL DATA



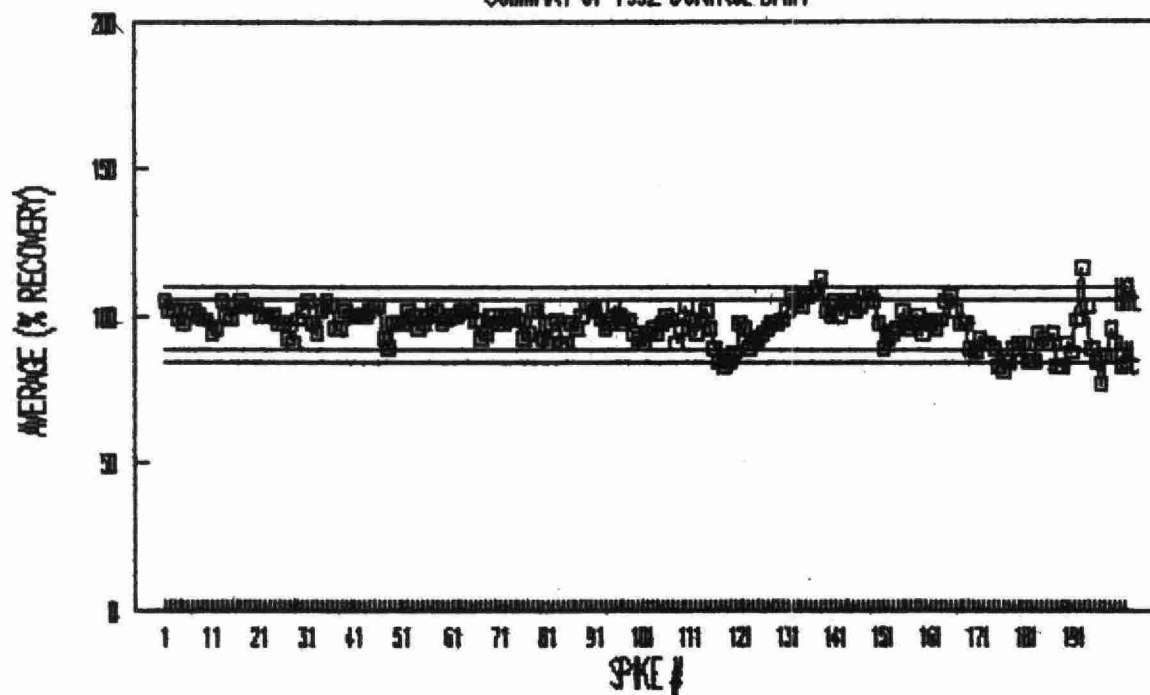
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SUMMARY OF 1992 CONTROL DATA



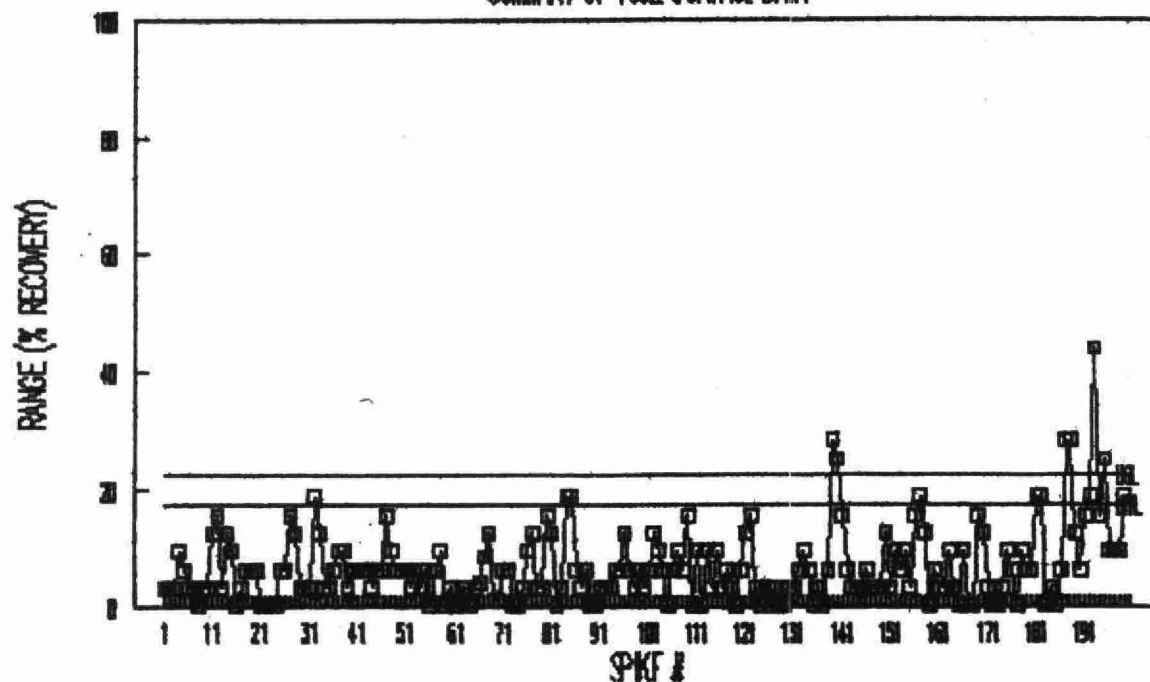
MSAVOL:CBENZ (fid)

SUMMARY OF 1992 CONTROL DATA



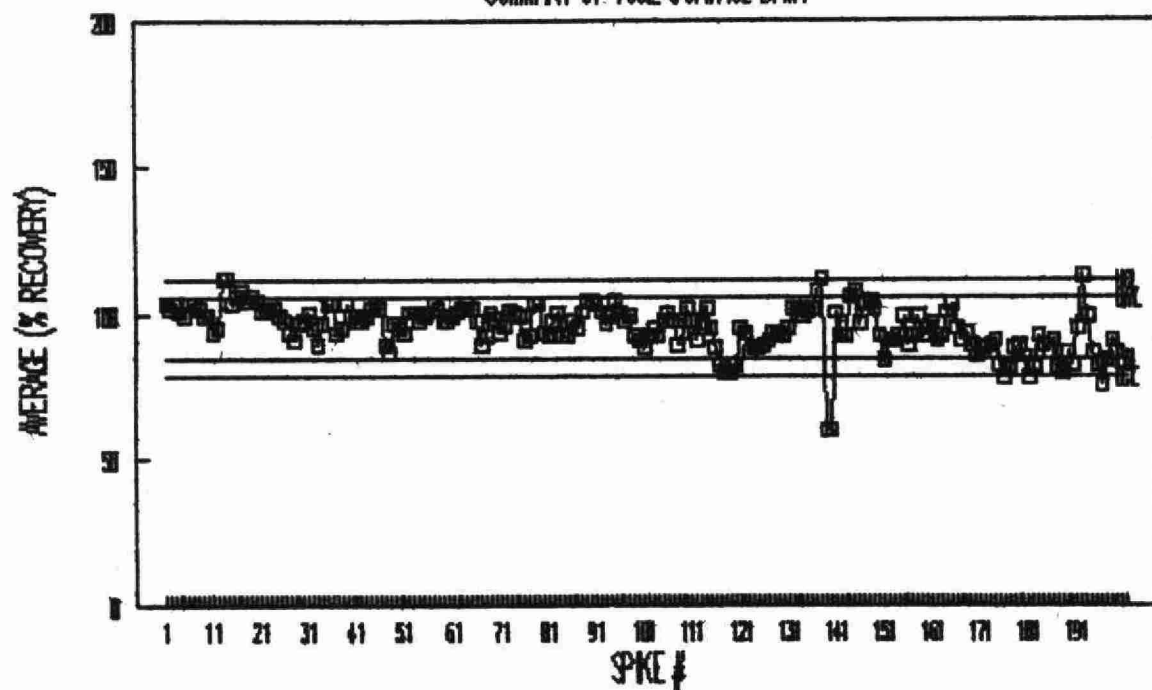
MSAVOL:CBENZ (fid)

SUMMARY OF 1992 CONTROL DATA



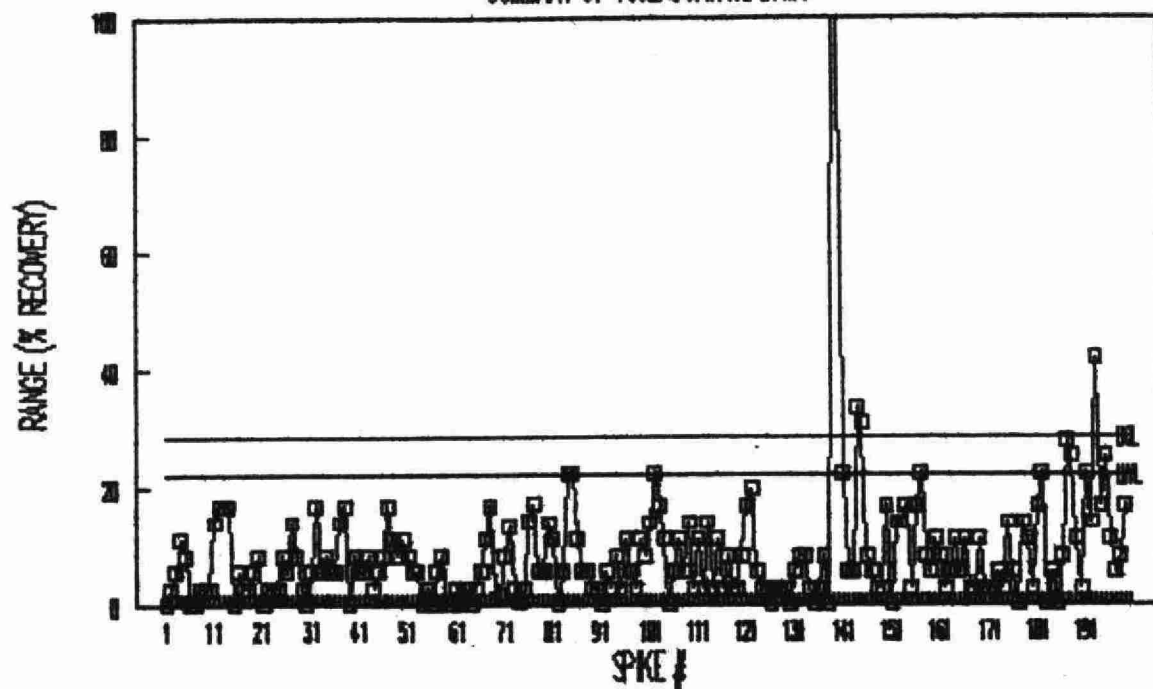
MSAVOL:EBENZ (fid)

SUMMARY OF 1992 CONTROL DATA



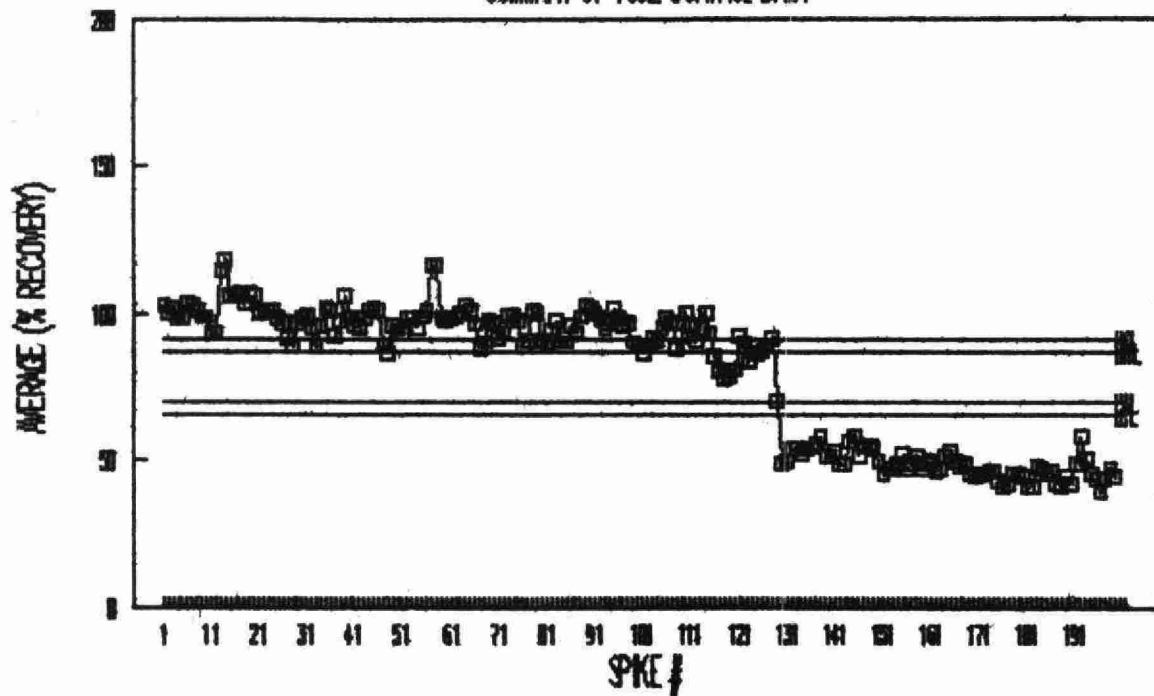
MSAVOL:EBENZ (fid)

SUMMARY OF 1992 CONTROL DATA



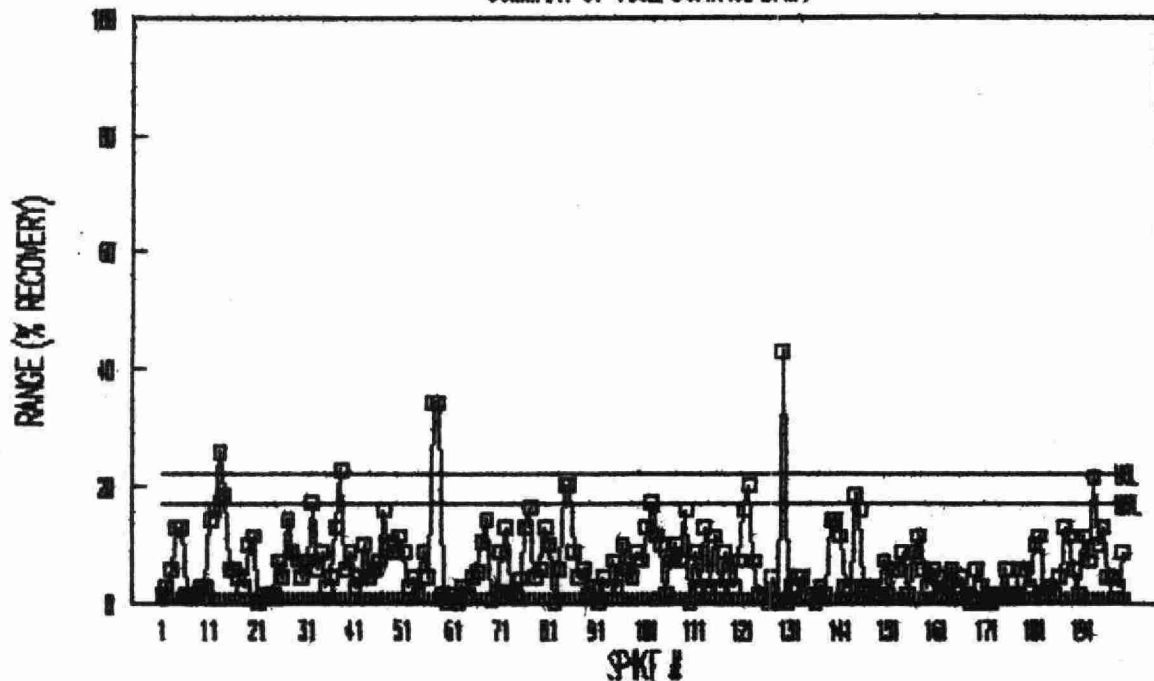
MSAVOL:MP-XY (fid)

SUMMARY OF 1992 CONTROL DATA



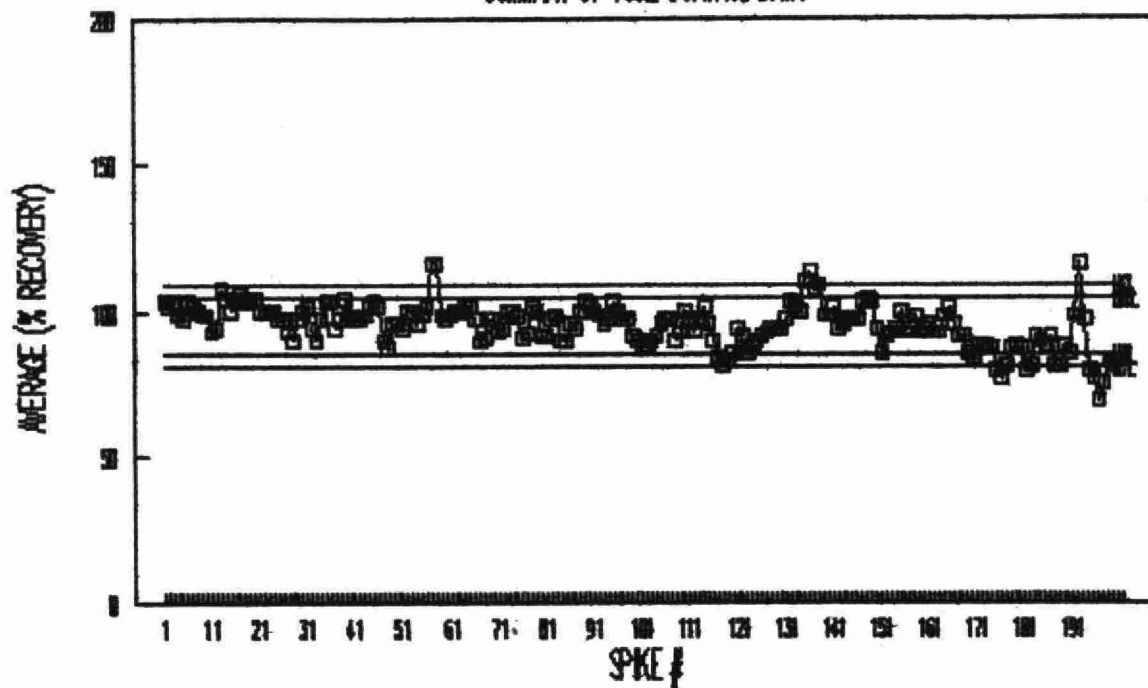
MSAVOL:MP-XY (fid)

SUMMARY OF 1992 CONTROL DATA



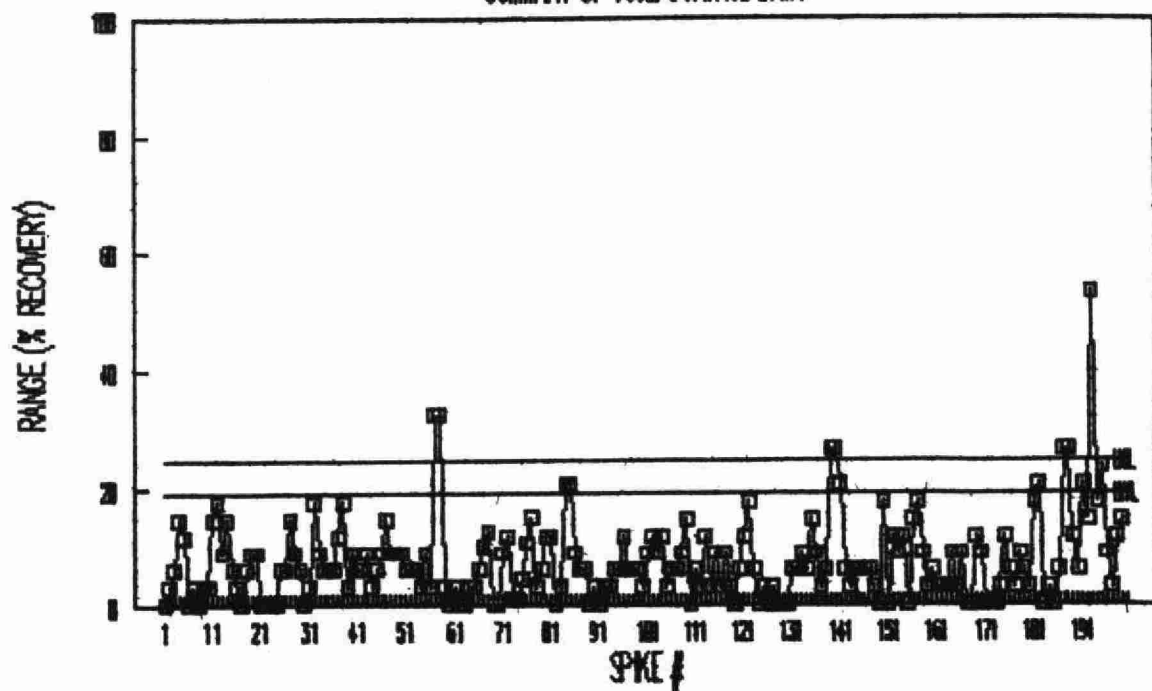
MSAVOL:O-XYL (fid)

SUMMARY OF 1992 CONTROL DATA



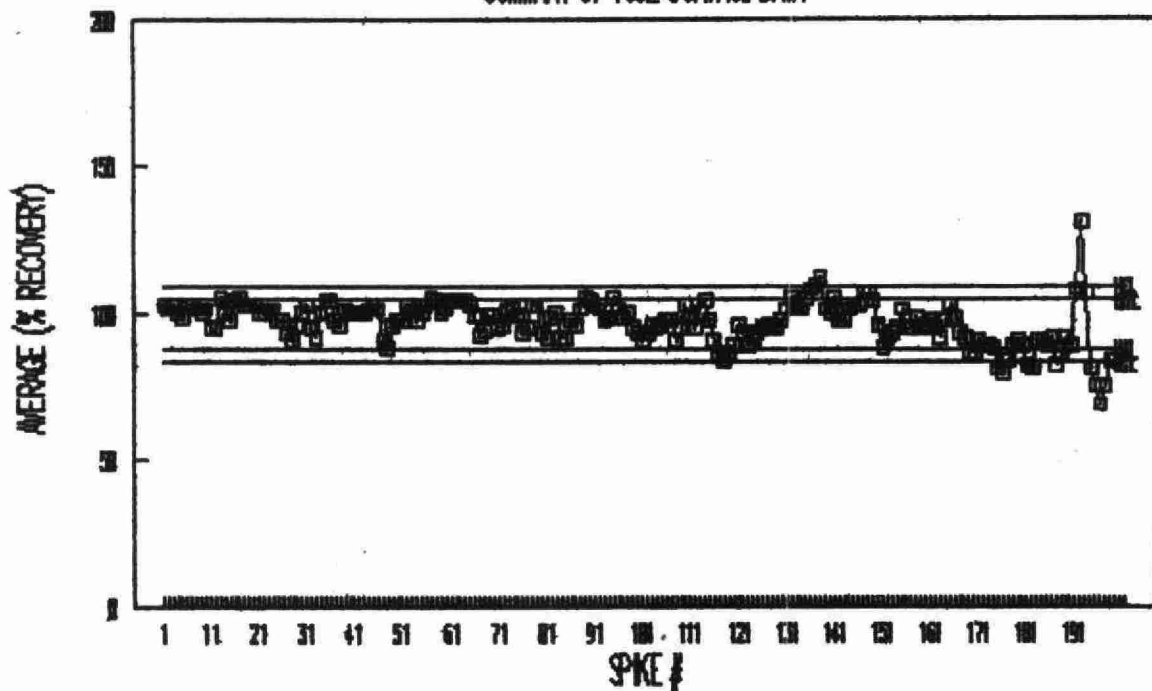
MSAVOL:O-XYL (fid)

SUMMARY OF 1992 CONTROL DATA



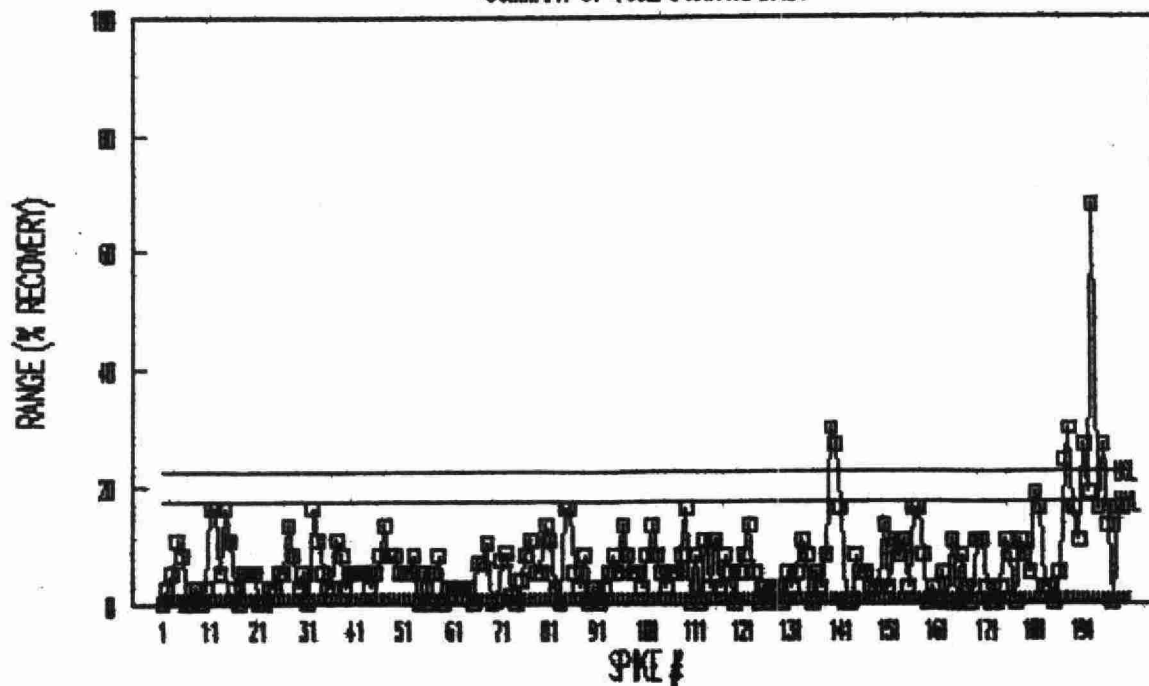
MSAVOL:STYR (fid)

SUMMARY OF 1992 CONTROL DATA



MSAVOL:STYR (fid)

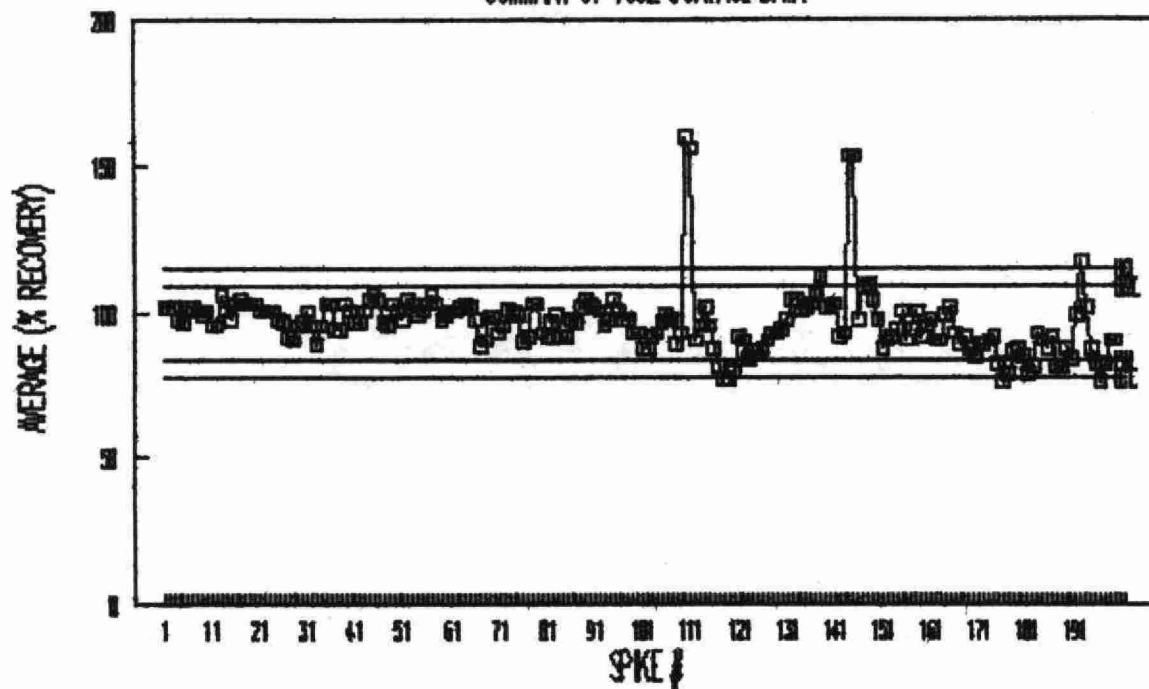
SUMMARY OF 1992 CONTROL DATA



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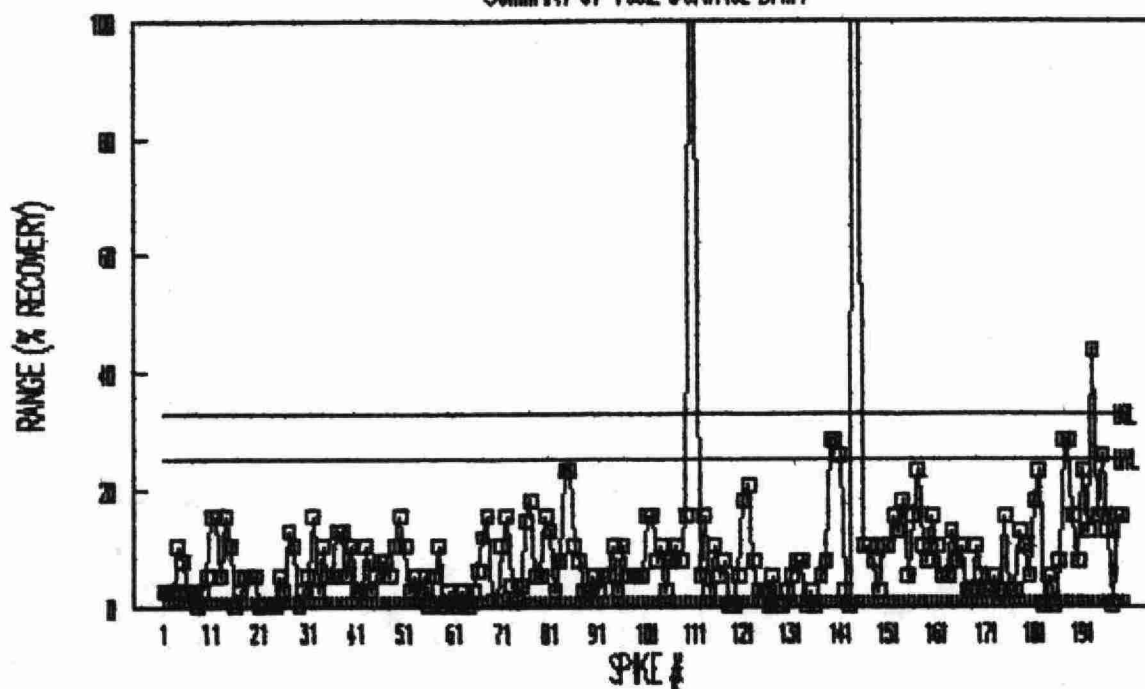
MSAVOL:CUM (fid)

SUMMARY OF 1992 CONTROL DATA



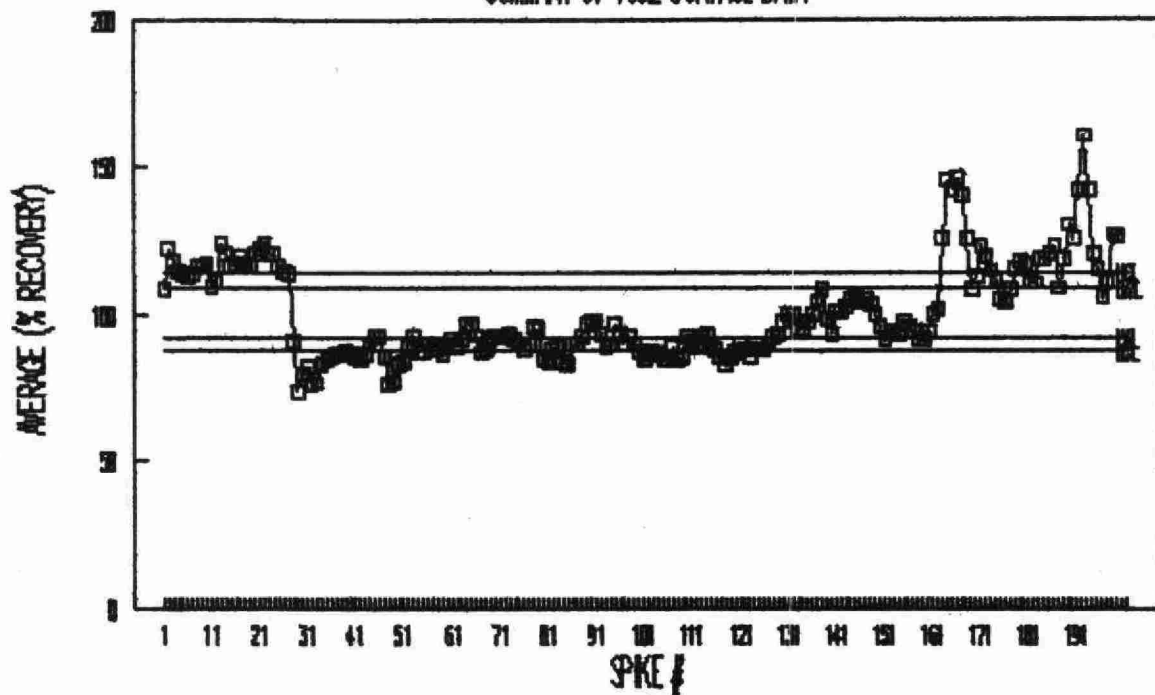
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SUMMARY OF 1992 CONTROL DATA



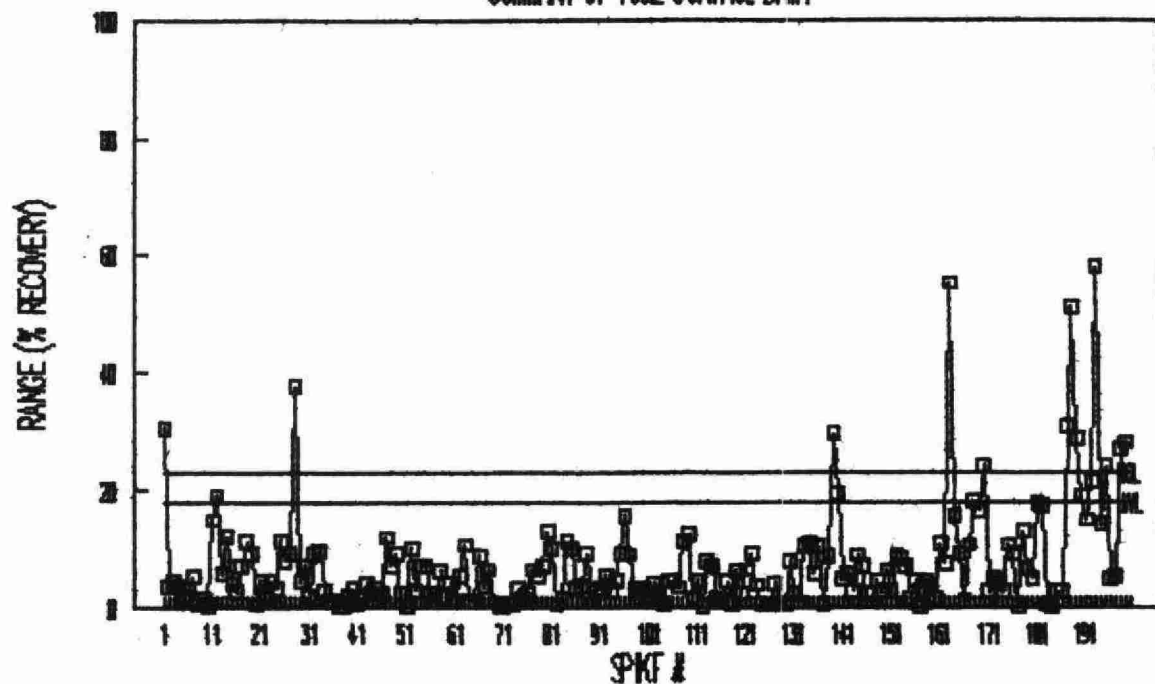
MSAVOL:BROMO (ecd)

SUMMARY OF 1992 CONTROL DATA



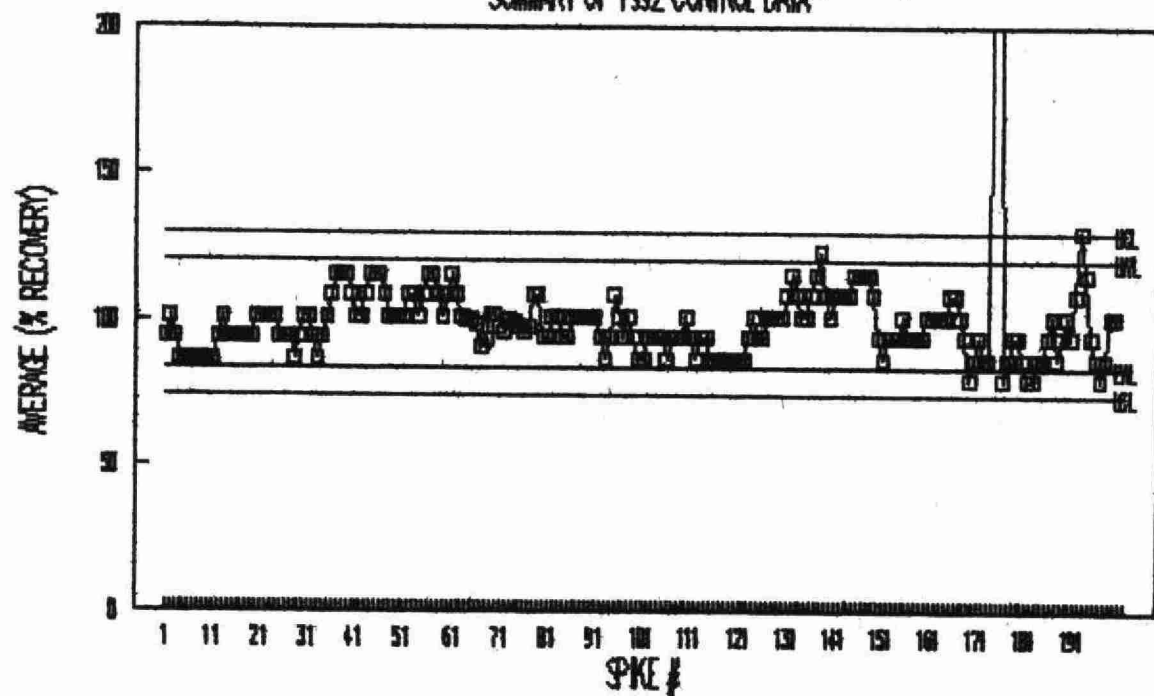
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SUMMARY OF 1992 CONTROL DATA



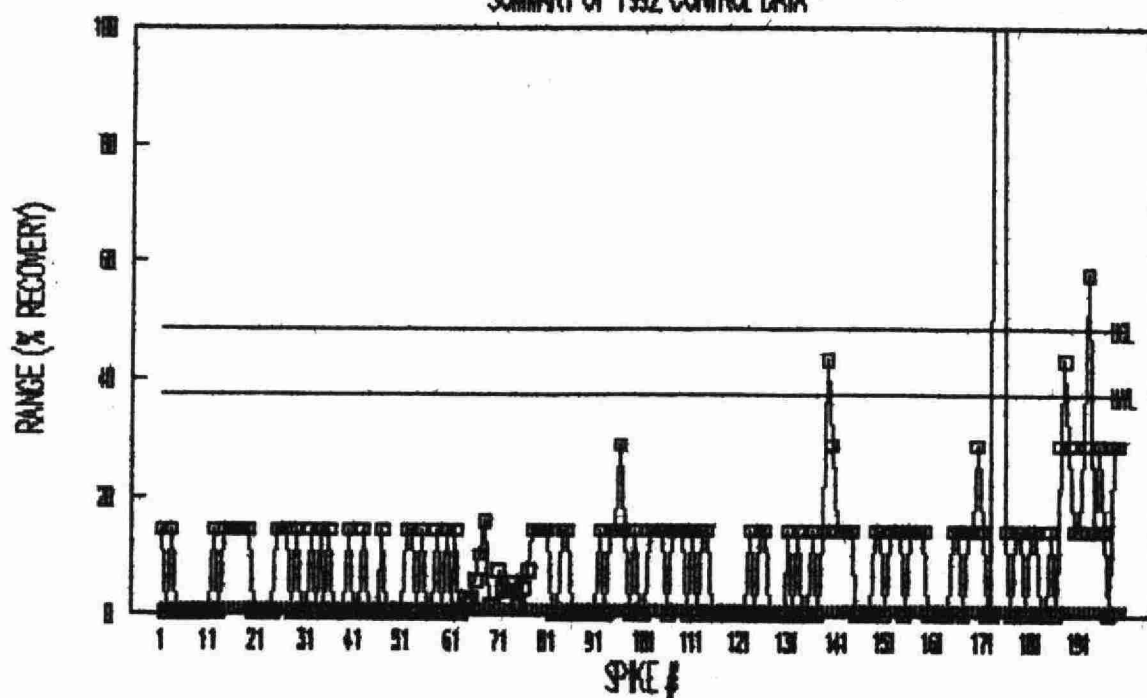
MSAVOL:1122T (fid)

SUMMARY OF 1992 CONTROL DATA



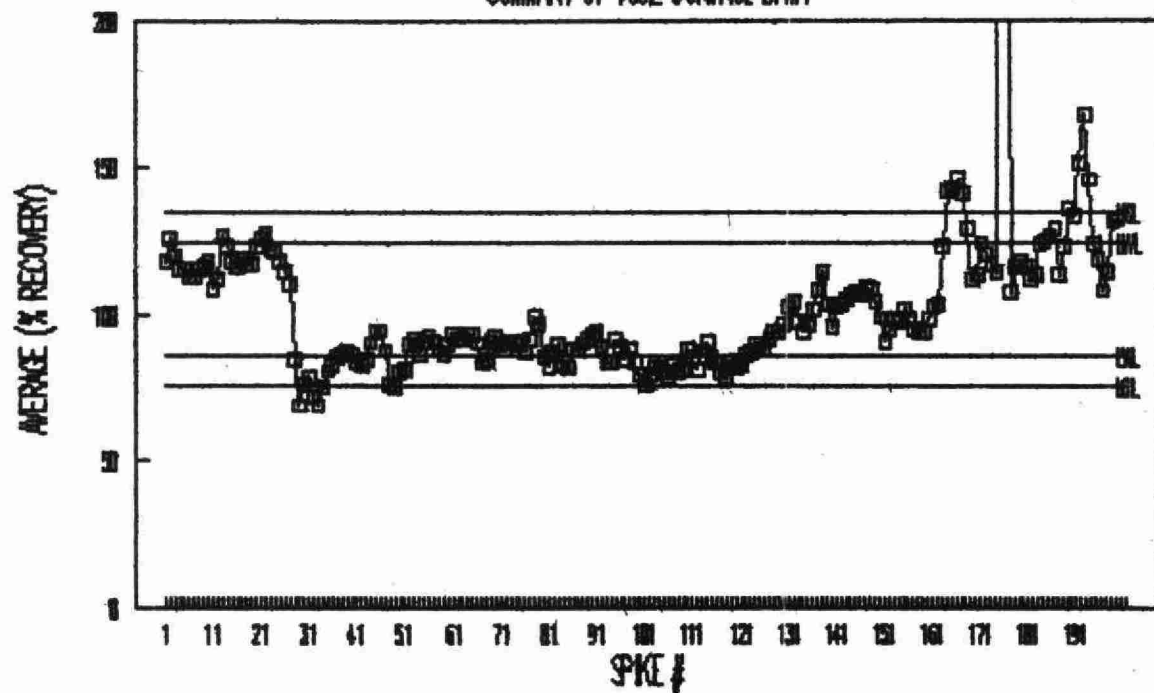
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SUMMARY OF 1992 CONTROL DATA



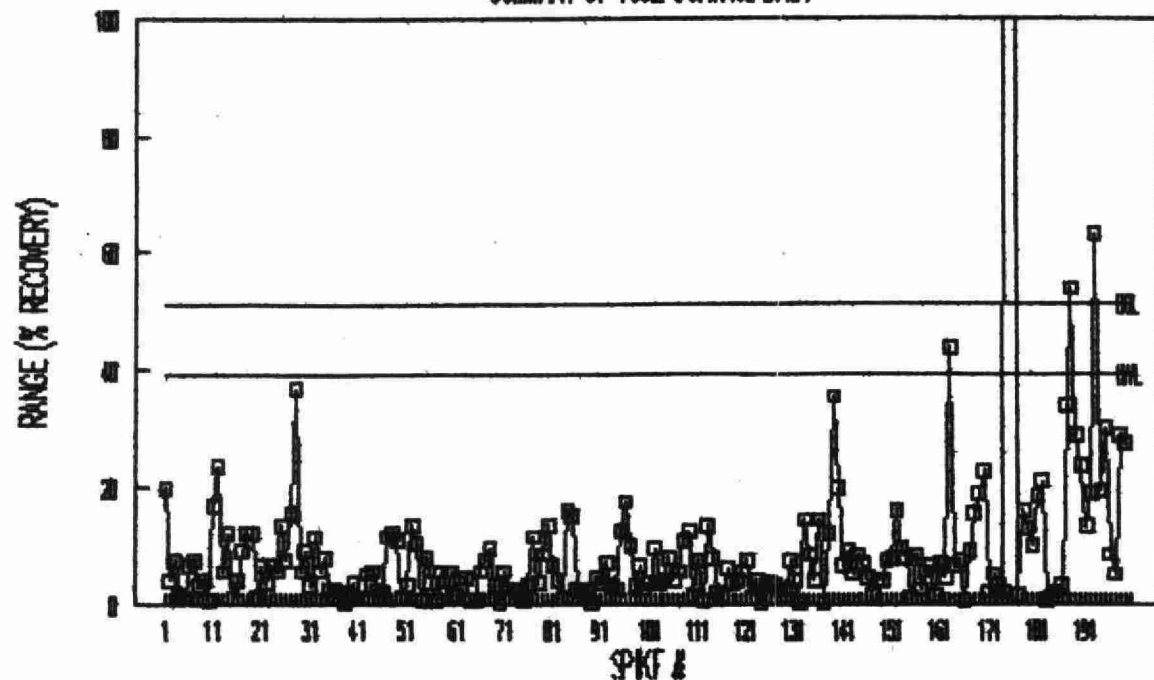
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SUMMARY OF 1992 CONTROL DATA



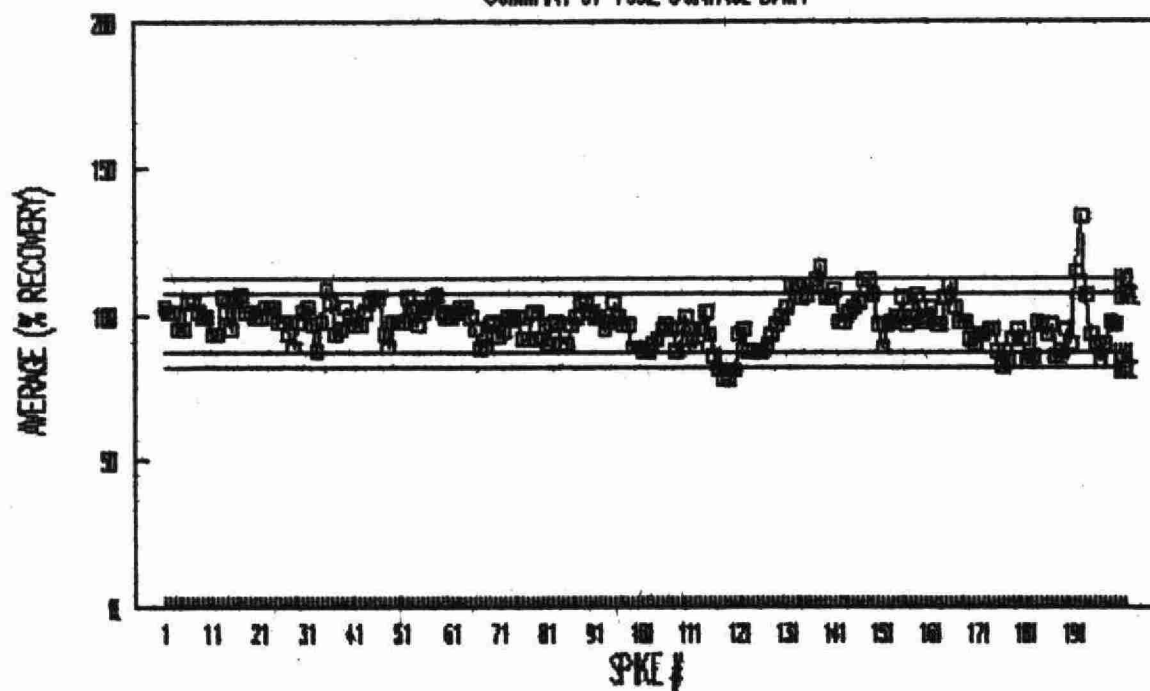
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SUMMARY OF 1992 CONTROL DATA



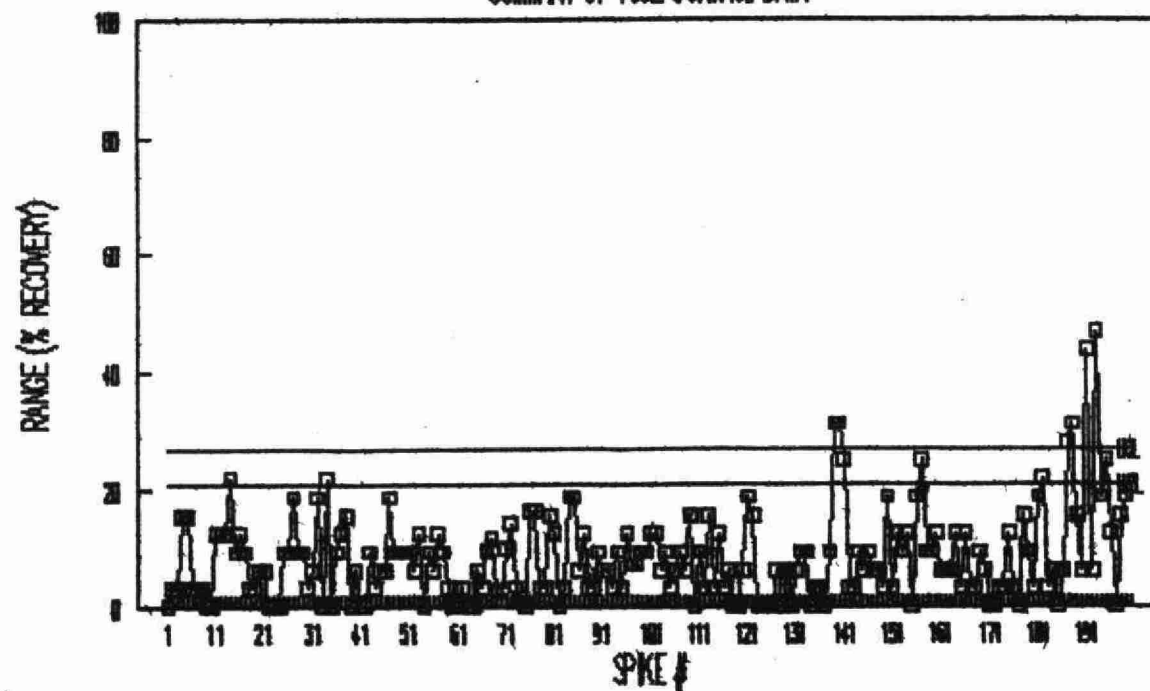
MSAVOL:MESIT (fid)

SUMMARY OF 1992 CONTROL DATA



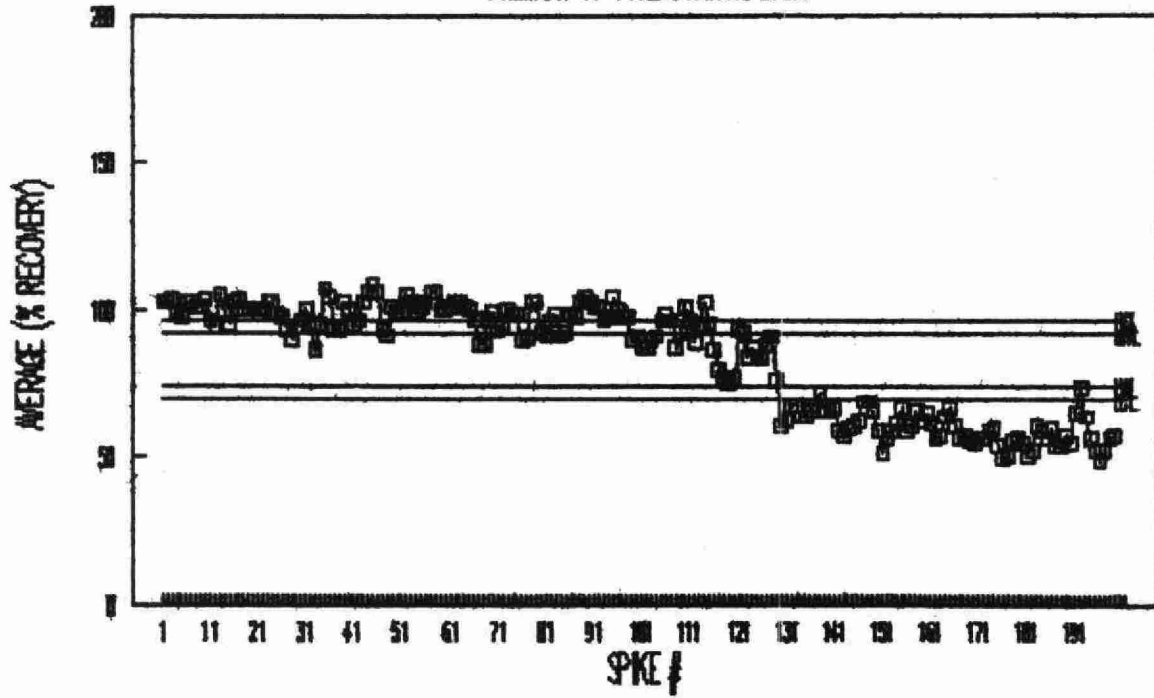
MSAVOL:MESIT (fid)

SUMMARY OF 1992 CONTROL DATA



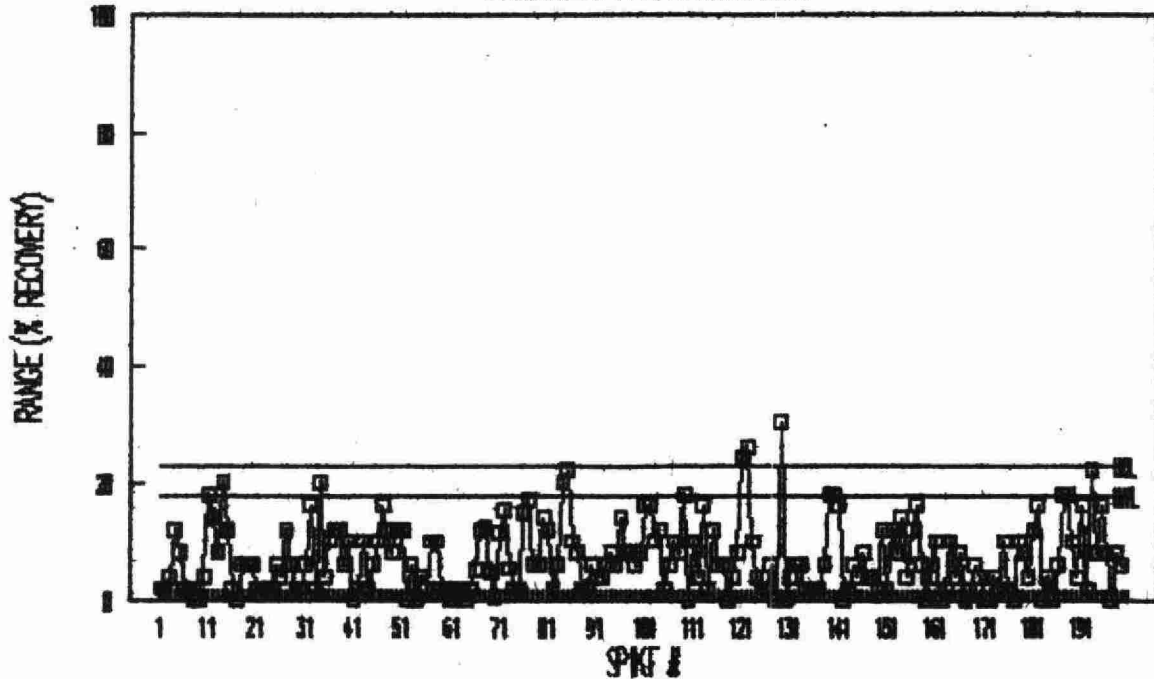
MSAVOL:P-CYM (fid)

SUMMARY OF 1992 CONTROL DATA



MSAVOL:P-CYM (fid)

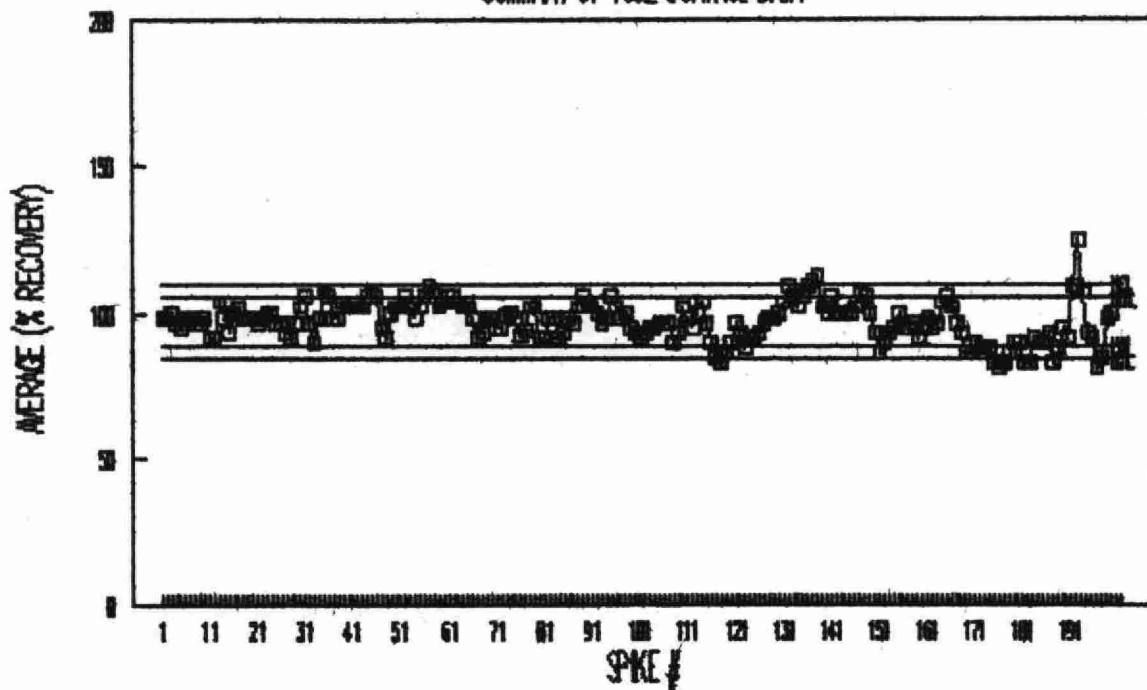
SUMMARY OF 1992 CONTROL DATA



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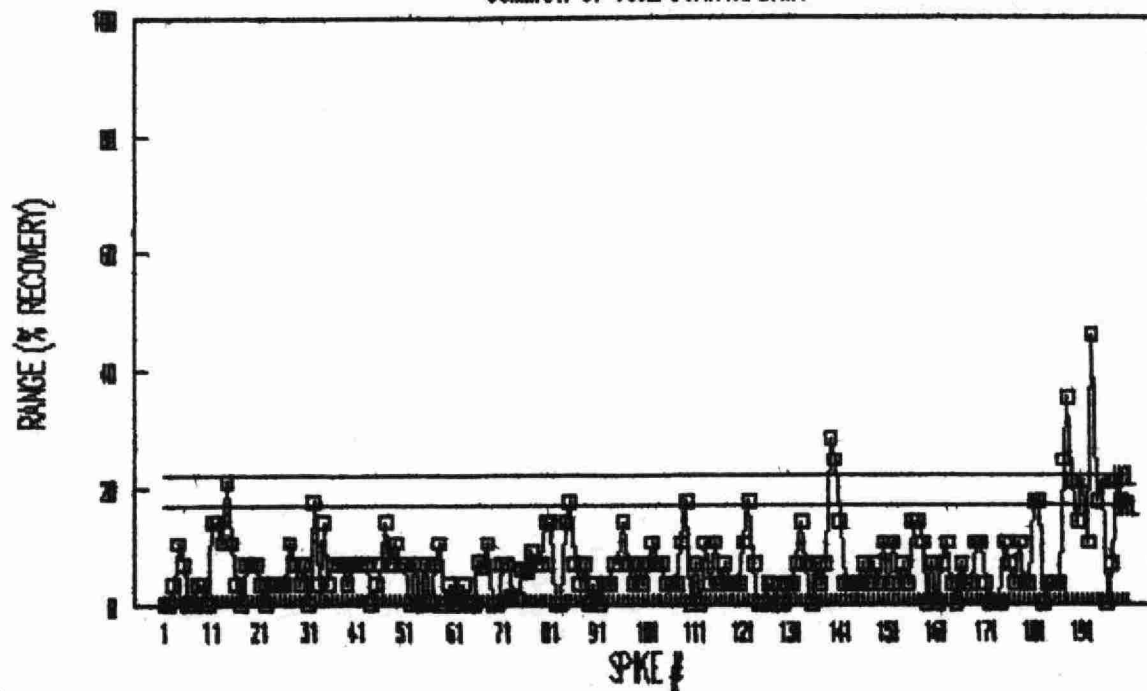
MSAVOL:M-DCB (fid)

SUMMARY OF 1992 CONTROL DATA



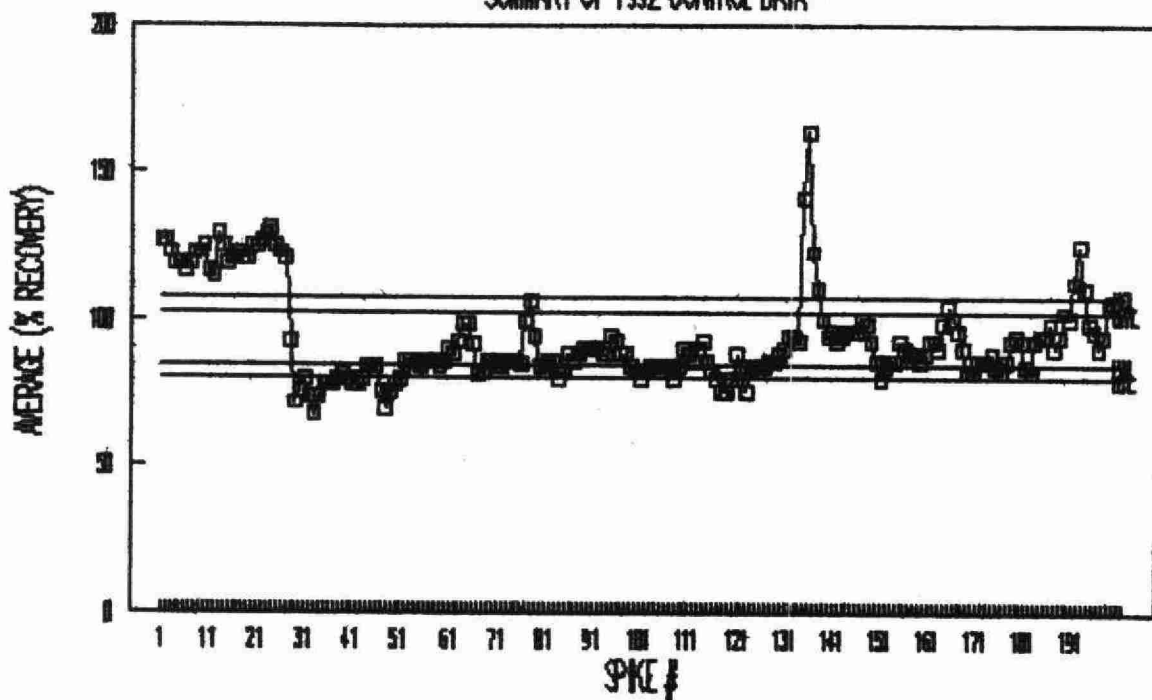
MSAVOL:M-DCB (fid)

SUMMARY OF 1992 CONTROL DATA



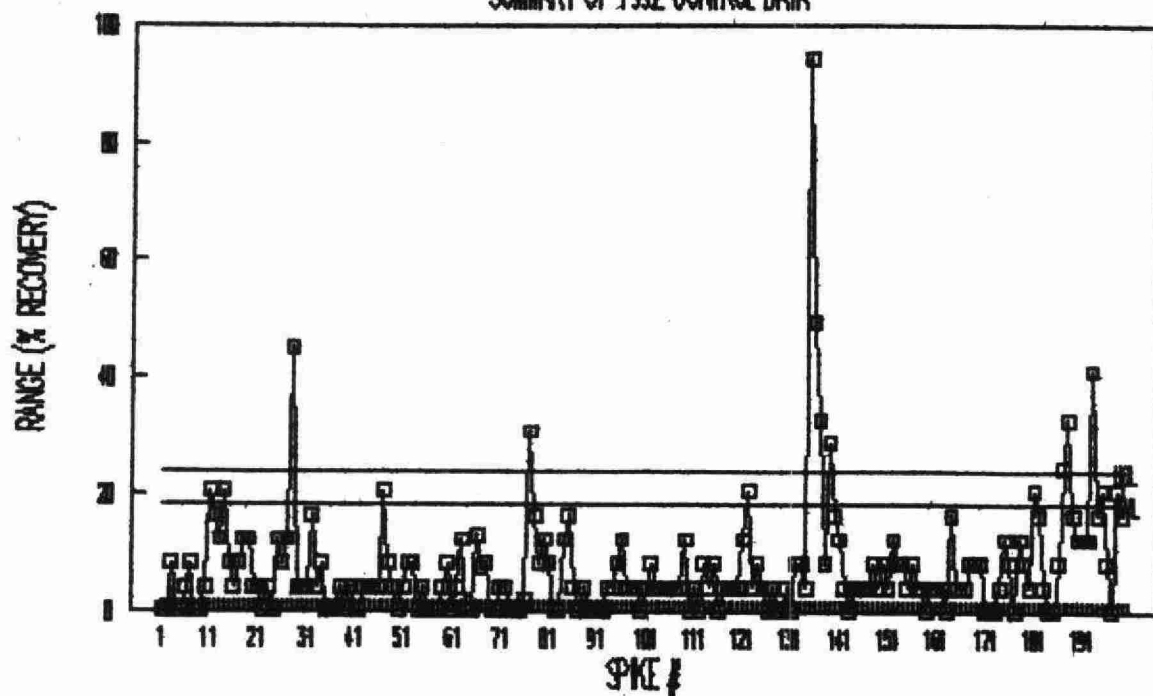
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SUMMARY OF 1992 CONTROL DATA



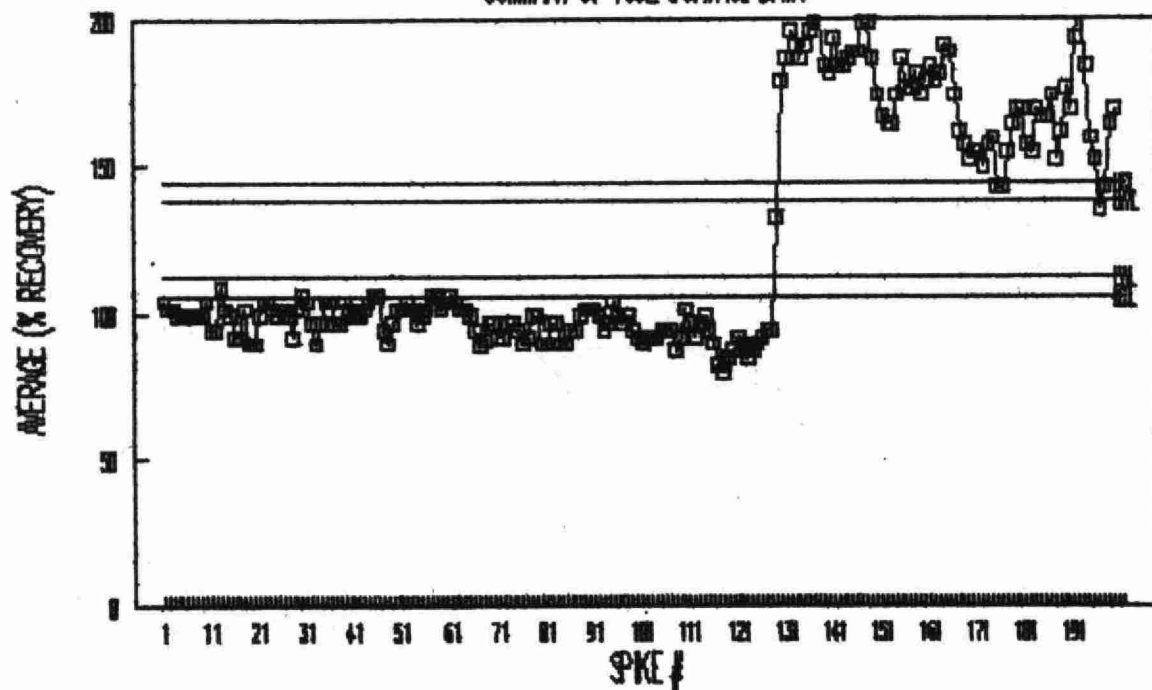
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SUMMARY OF 1992 CONTROL DATA



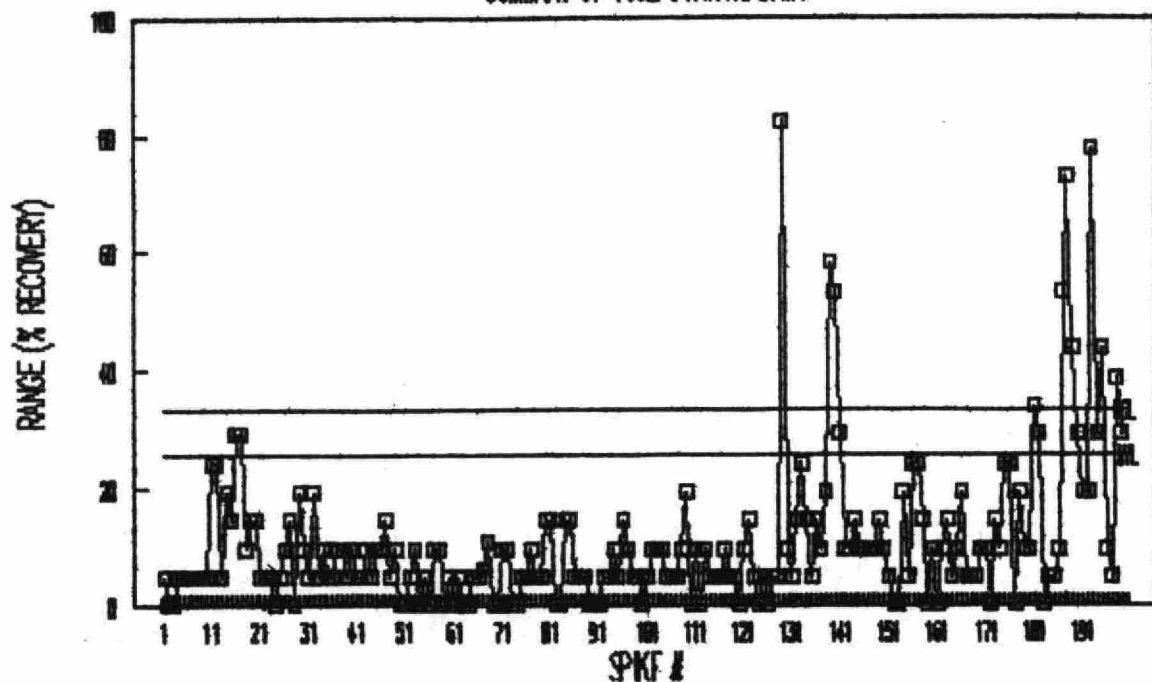
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SUMMARY OF 1992 CONTROL DATA



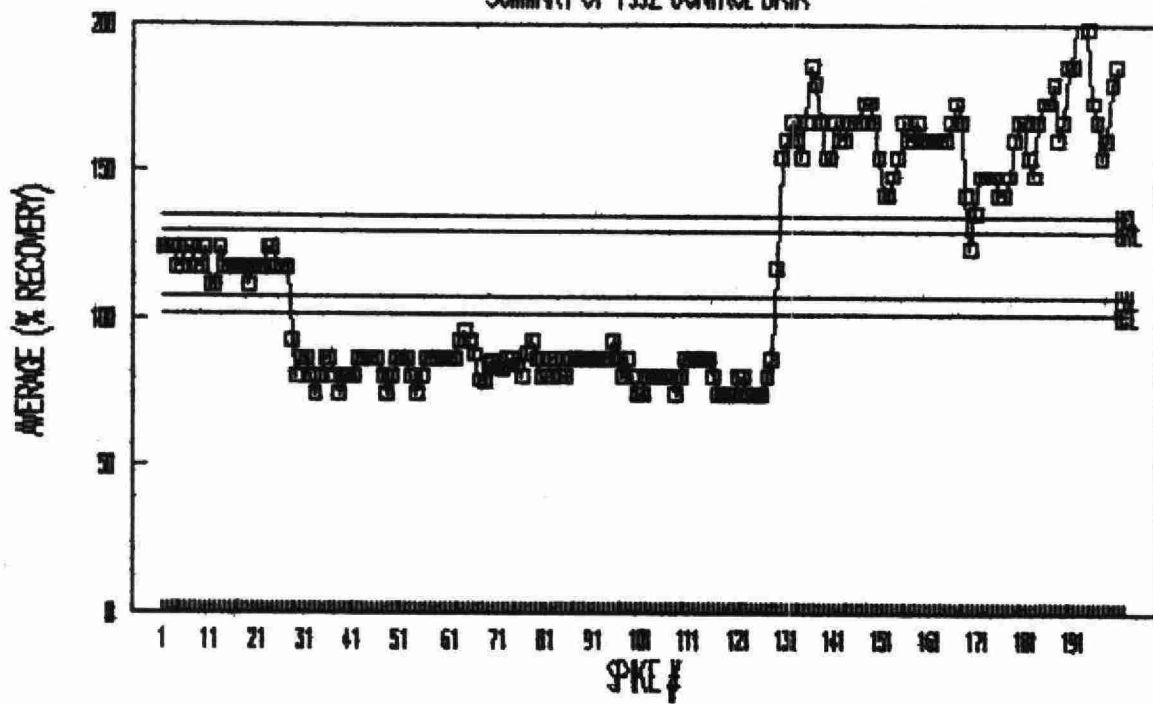
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SUMMARY OF 1992 CONTROL DATA



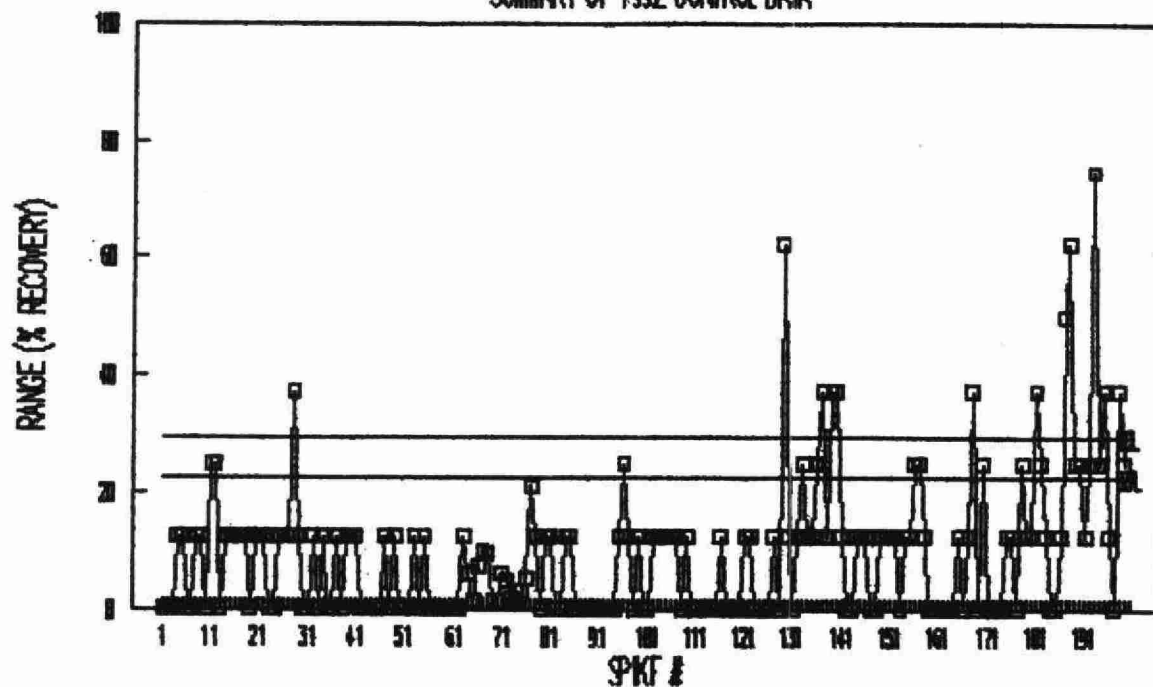
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SUMMARY OF 1992 CONTROL DATA



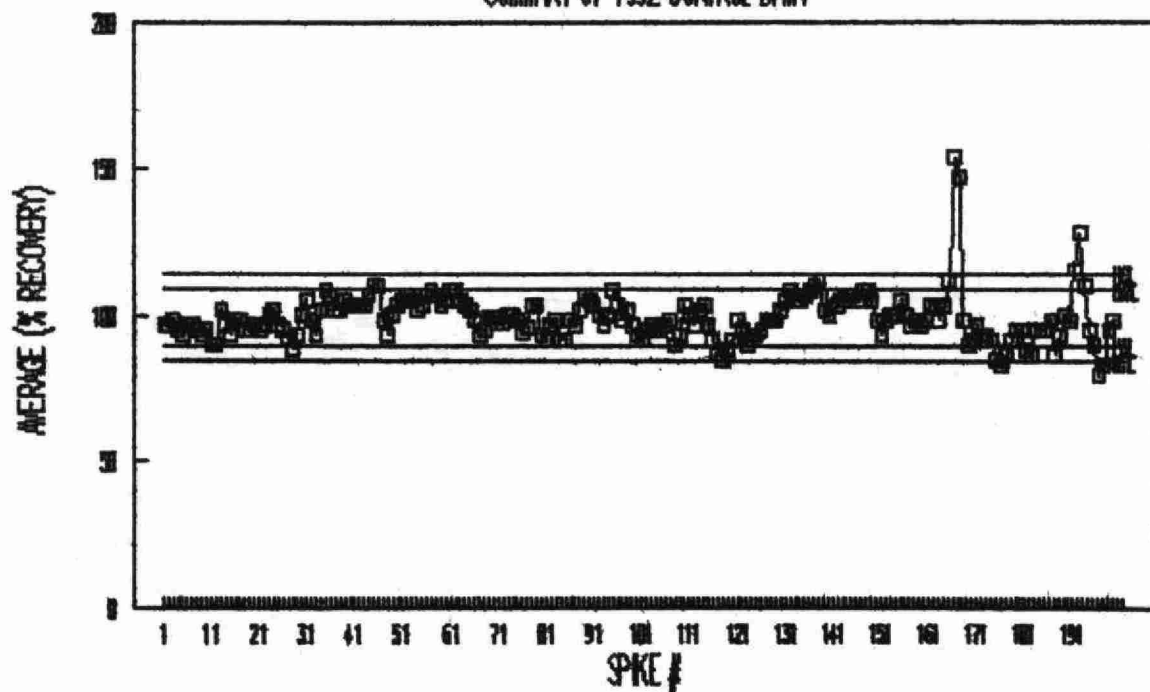
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SUMMARY OF 1992 CONTROL DATA



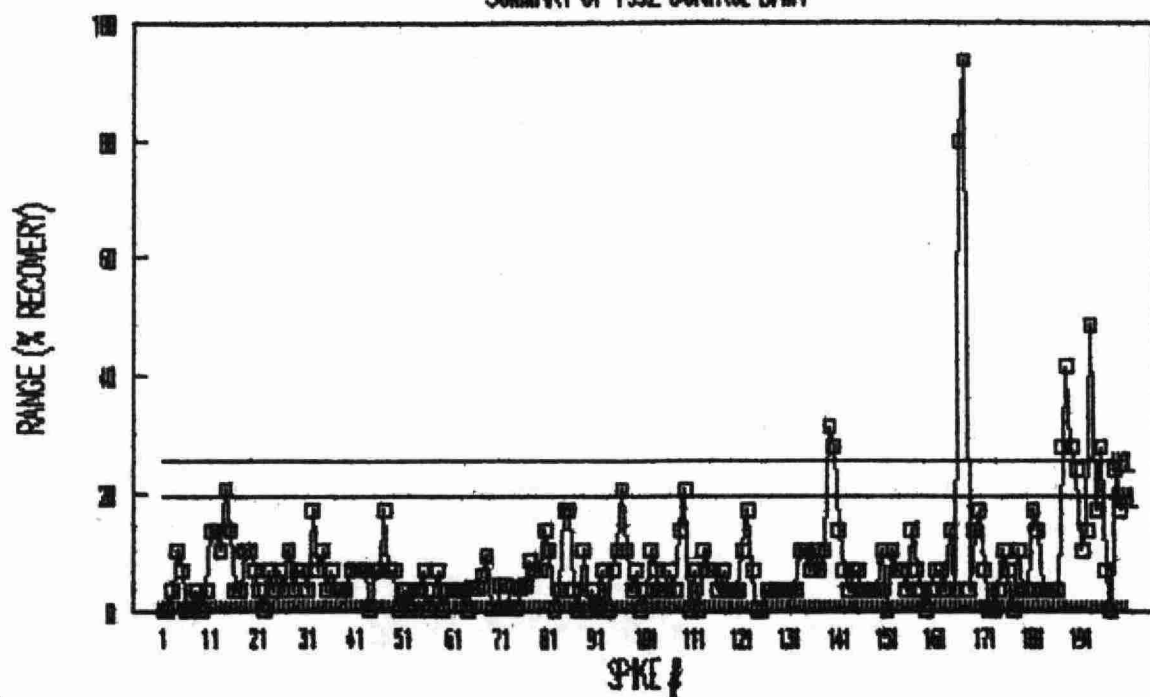
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SUMMARY OF 1992 CONTROL DATA



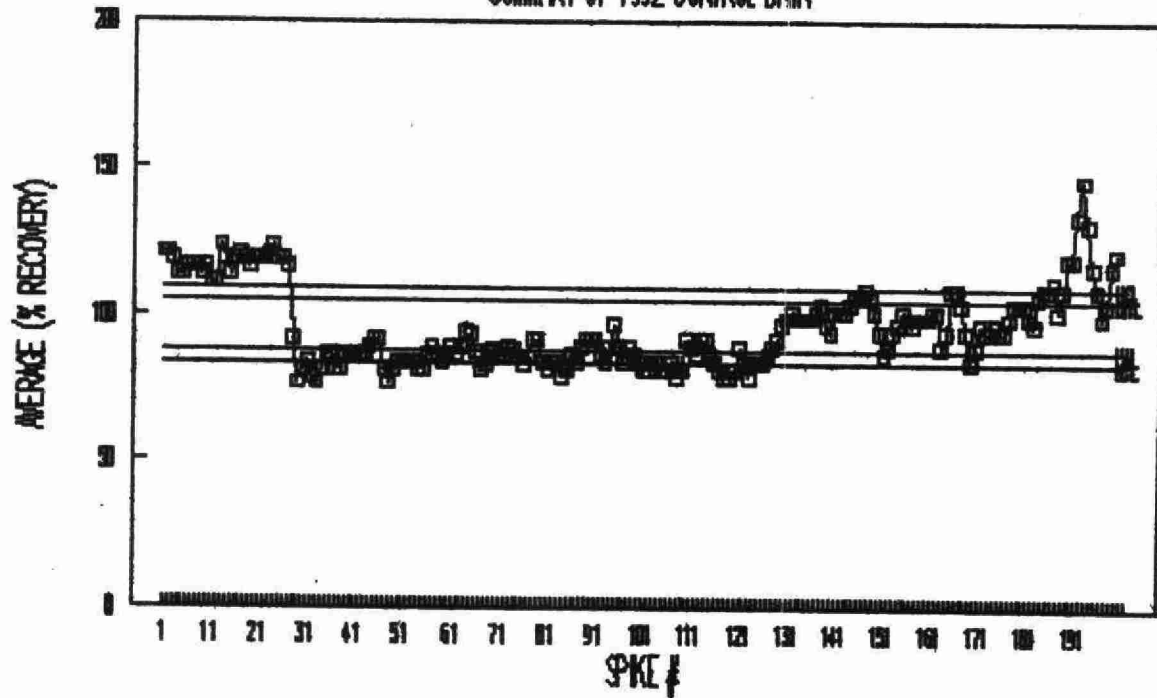
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SUMMARY OF 1992 CONTROL DATA



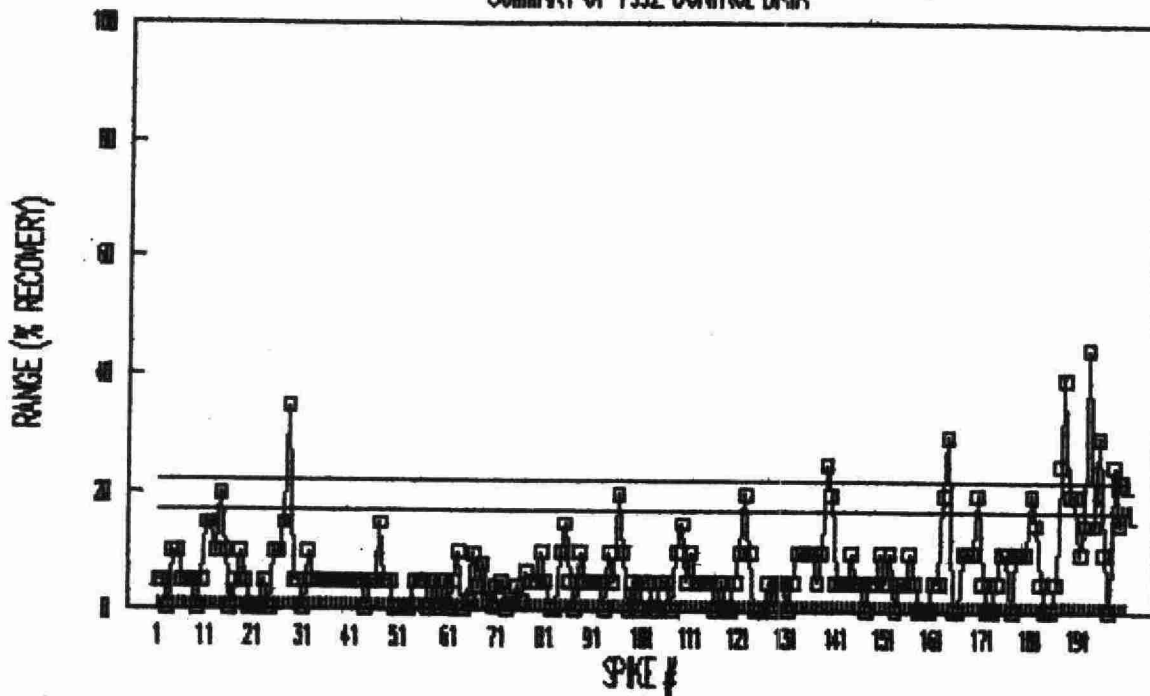
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SUMMARY OF 1992 CONTROL DATA



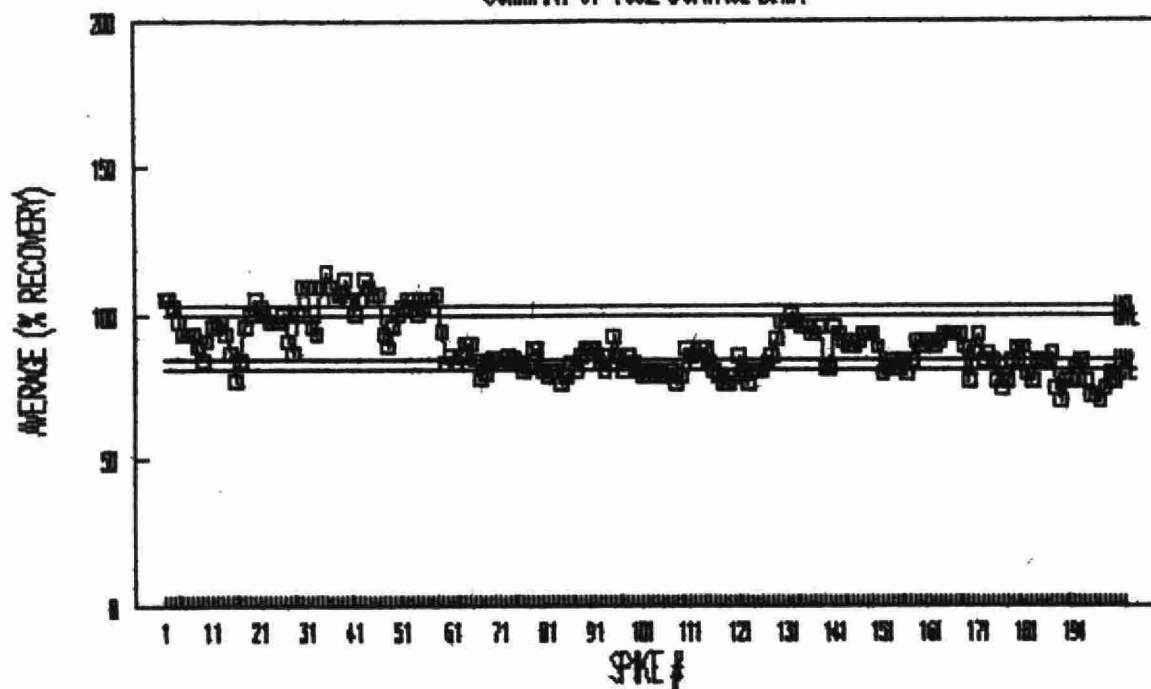
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SUMMARY OF 1992 CONTROL DATA



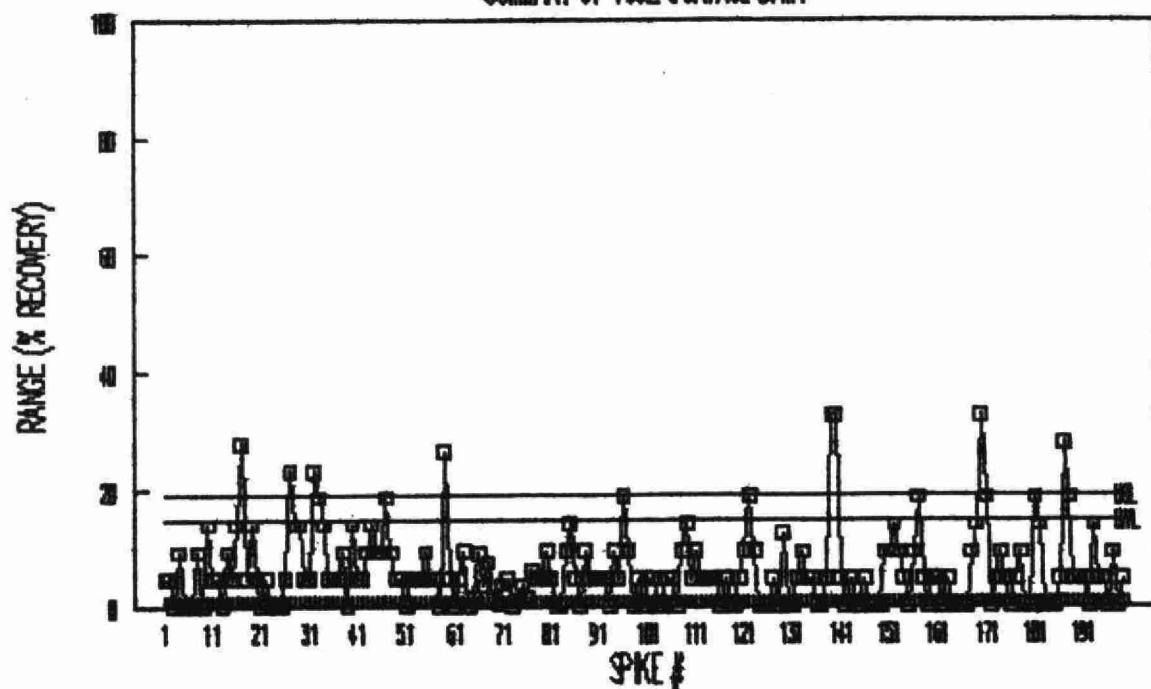
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SUMMARY OF 1992 CONTROL DATA



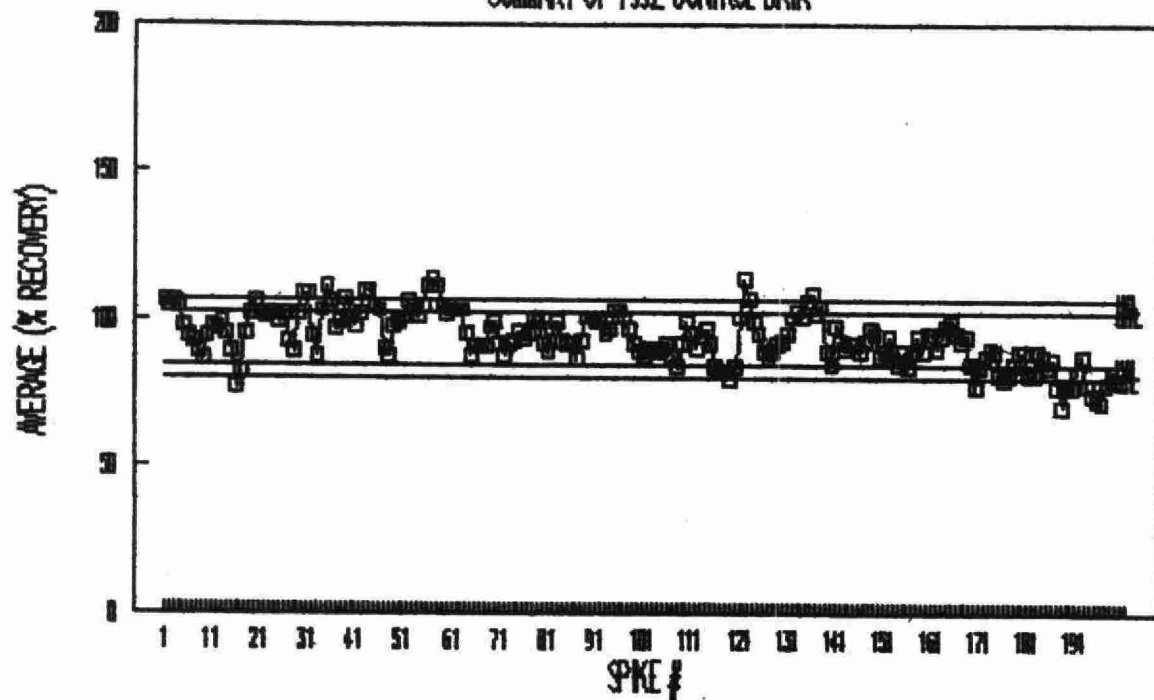
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SUMMARY OF 1992 CONTROL DATA



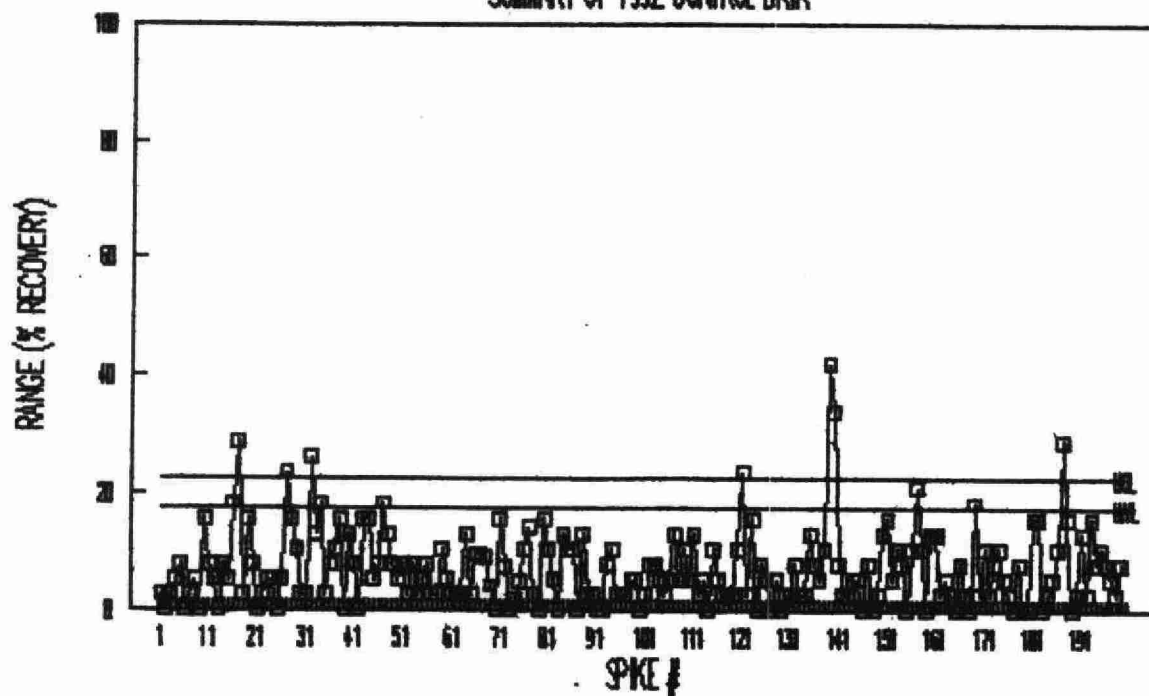
MSAVOL:D8-TOL (fid)

SUMMARY OF 1992 CONTROL DATA



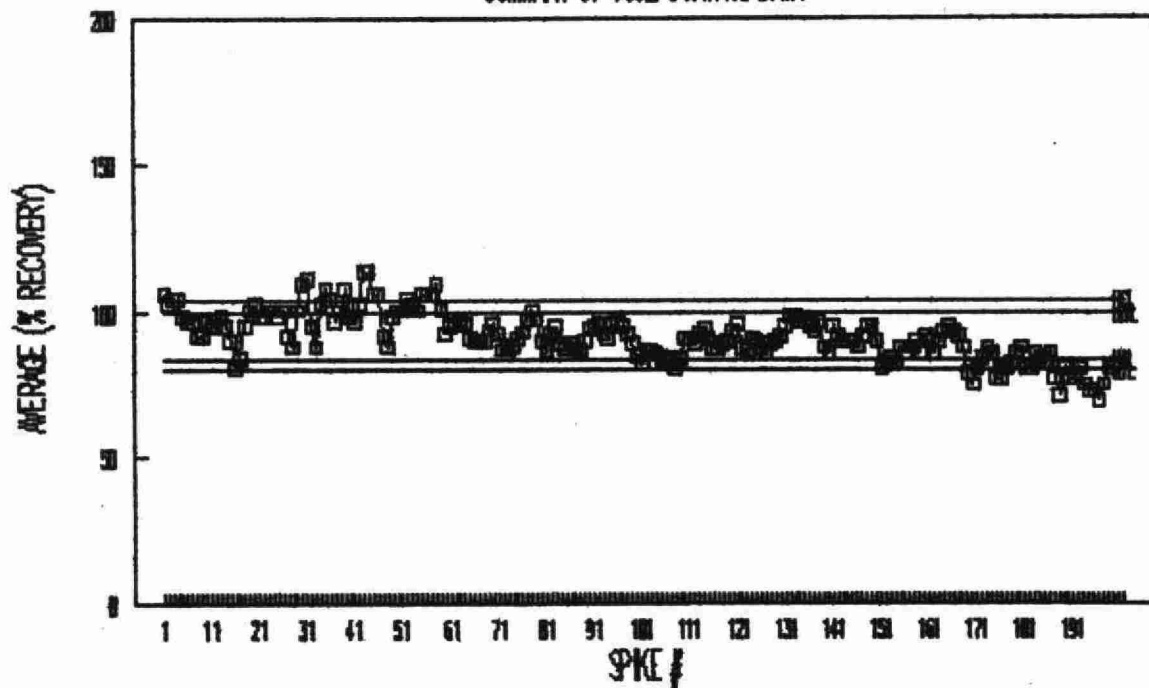
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SUMMARY OF 1992 CONTROL DATA



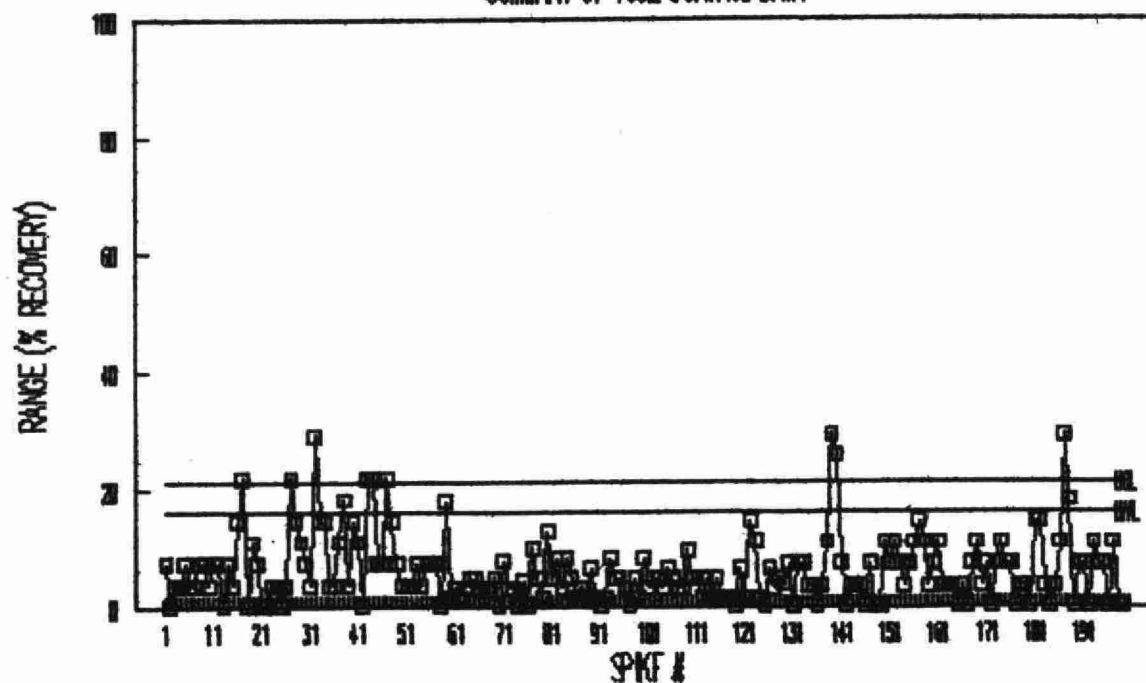
MSAVOL:D5-CB (fid)

SUMMARY OF 1992 CONTROL DATA



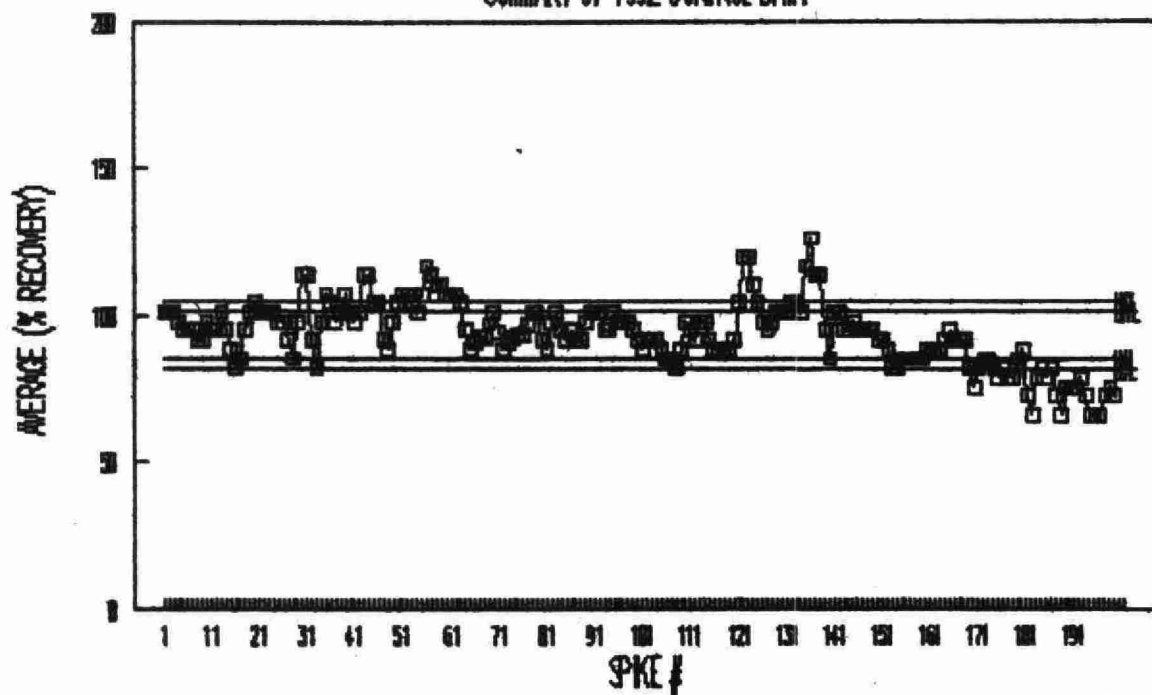
MSAVOL:D5-CB (fid)

SUMMARY OF 1992 CONTROL DATA



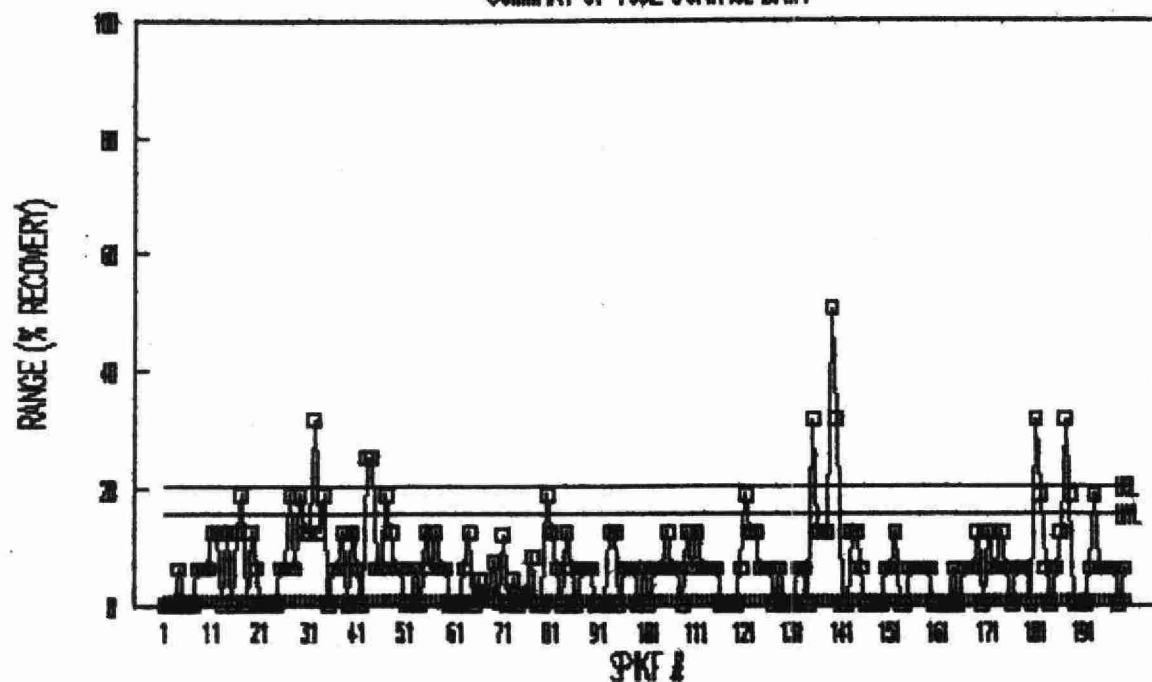
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SUMMARY OF 1992 CONTROL DATA



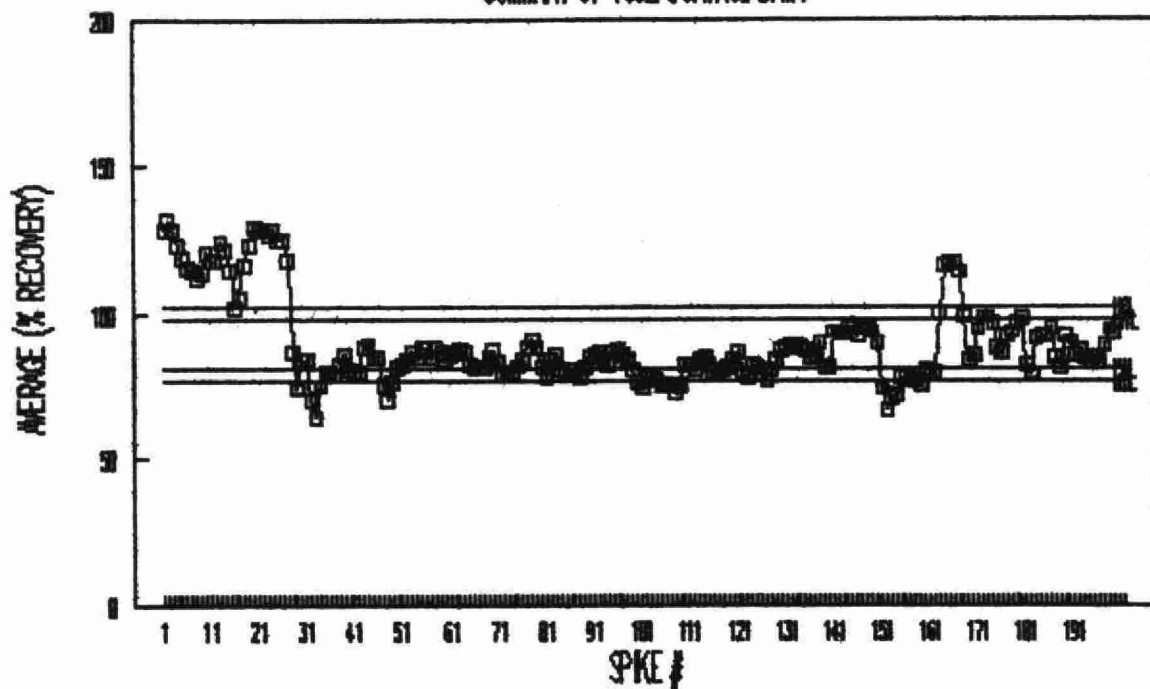
MSAVOL:D4T13P (fid)

SUMMARY OF 1992 CONTROL DATA



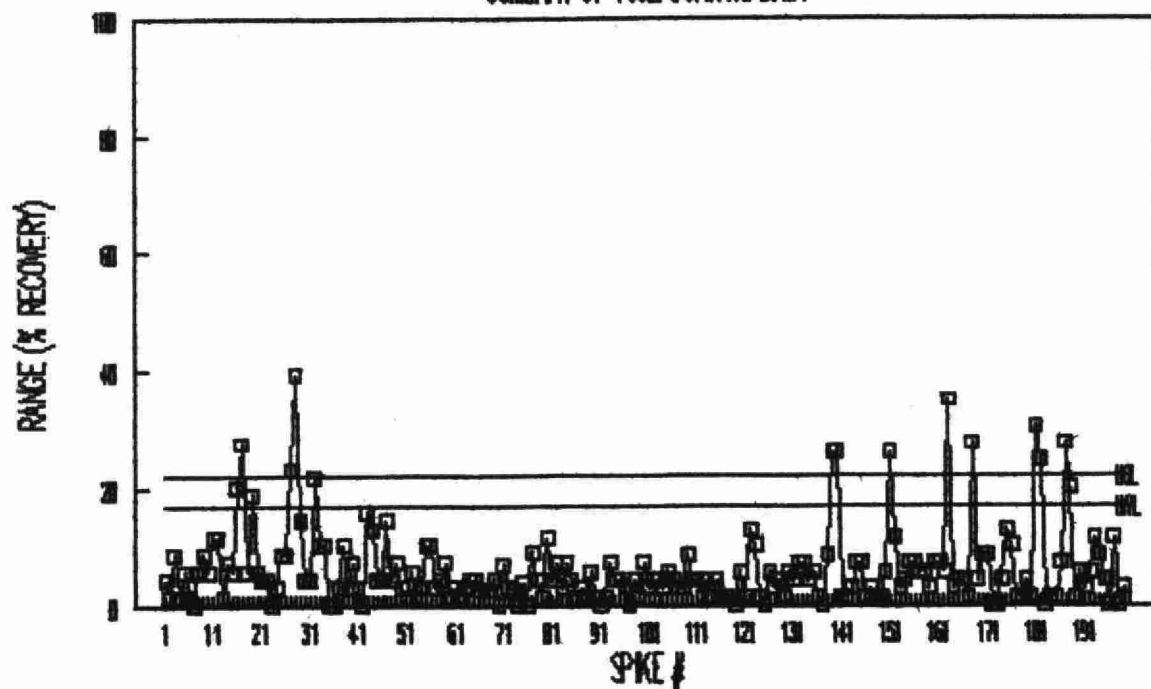
MSAVOL:D4T13P (ecd)

SUMMARY OF 1992 CONTROL DATA



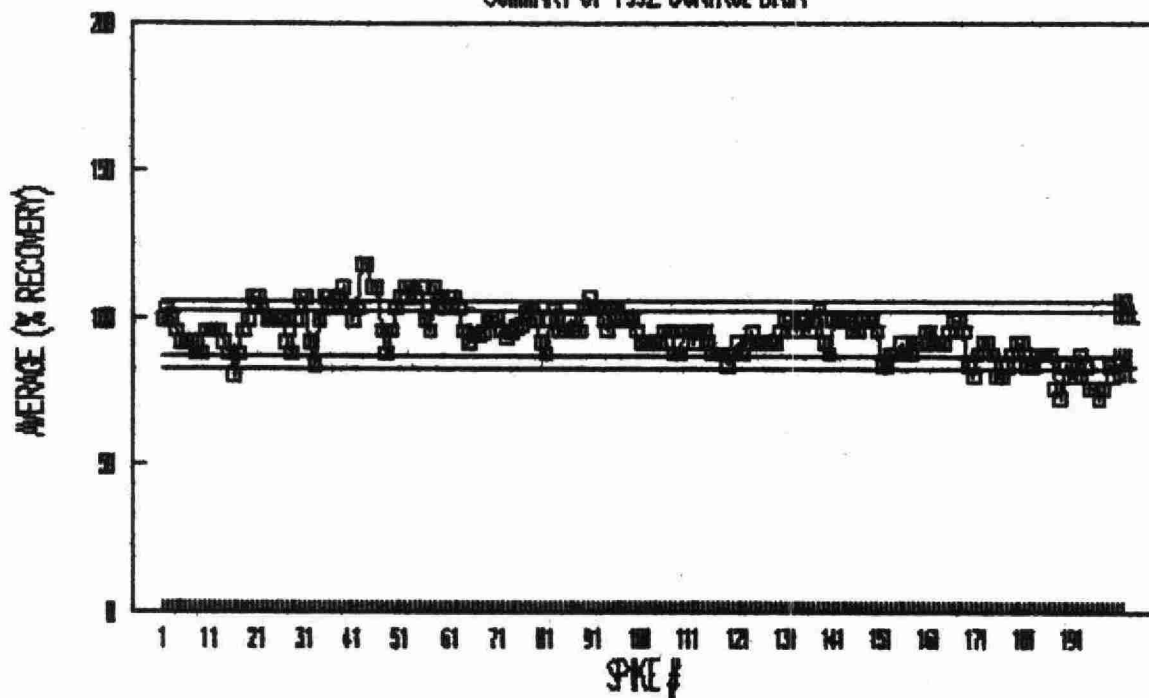
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SUMMARY OF 1992 CONTROL DATA



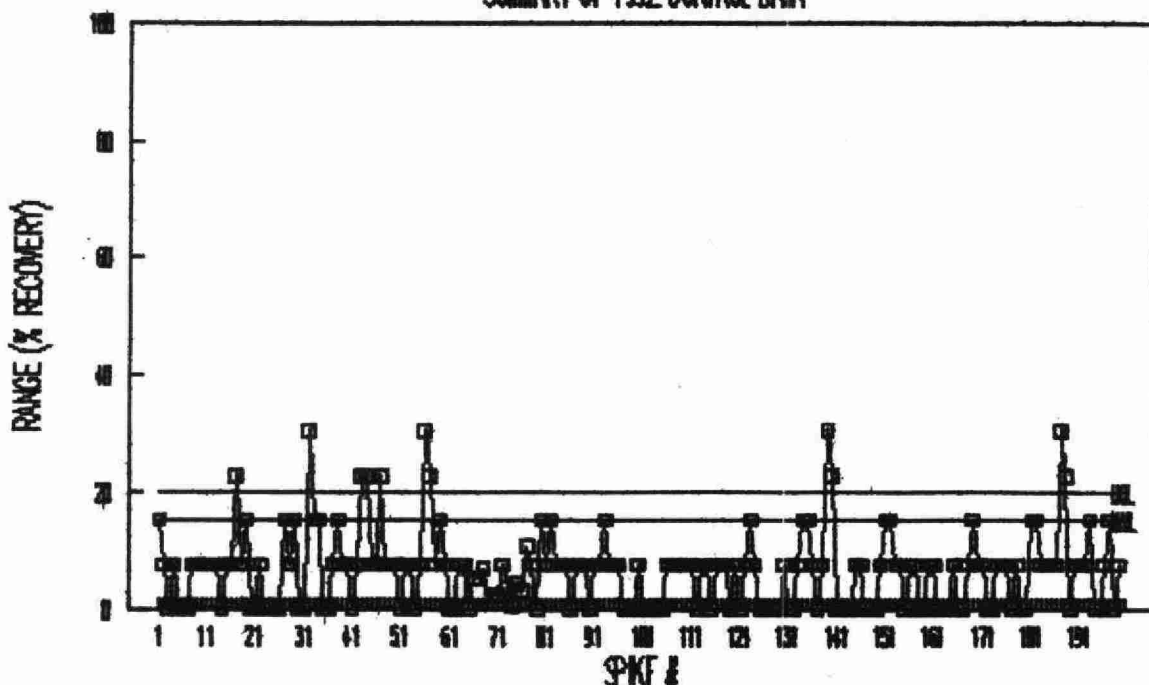
57
MSAVOL:D4-EDB (fid)

SUMMARY OF 1992 CONTROL DATA



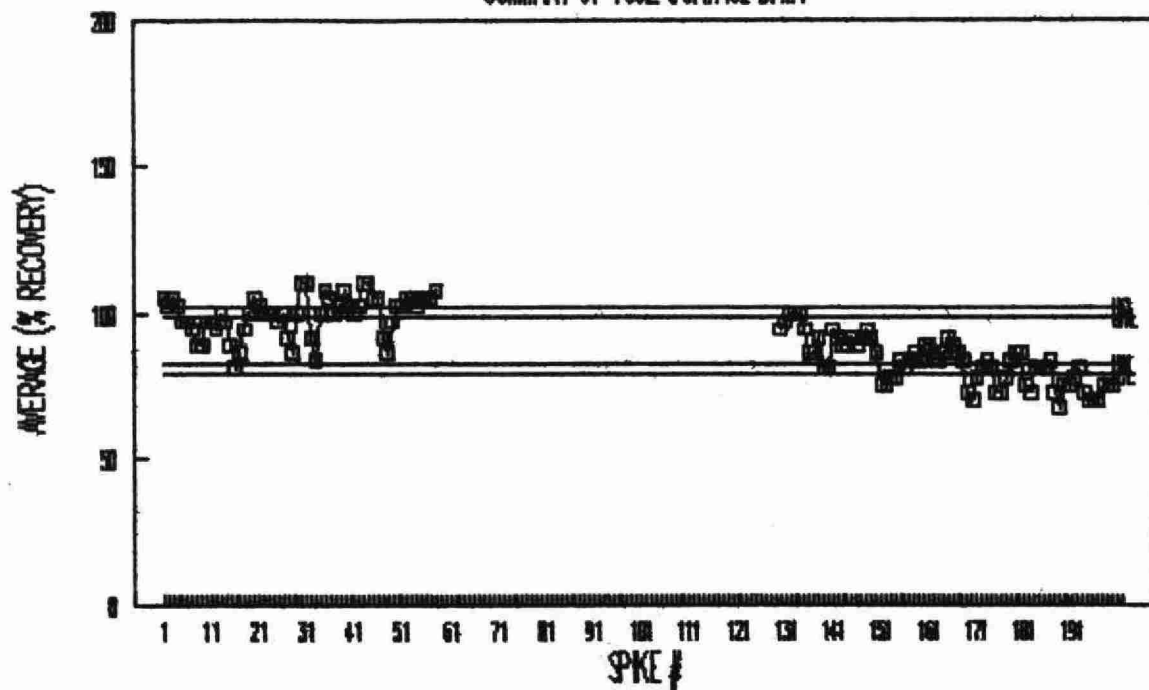
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SUMMARY OF 1992 CONTROL DATA



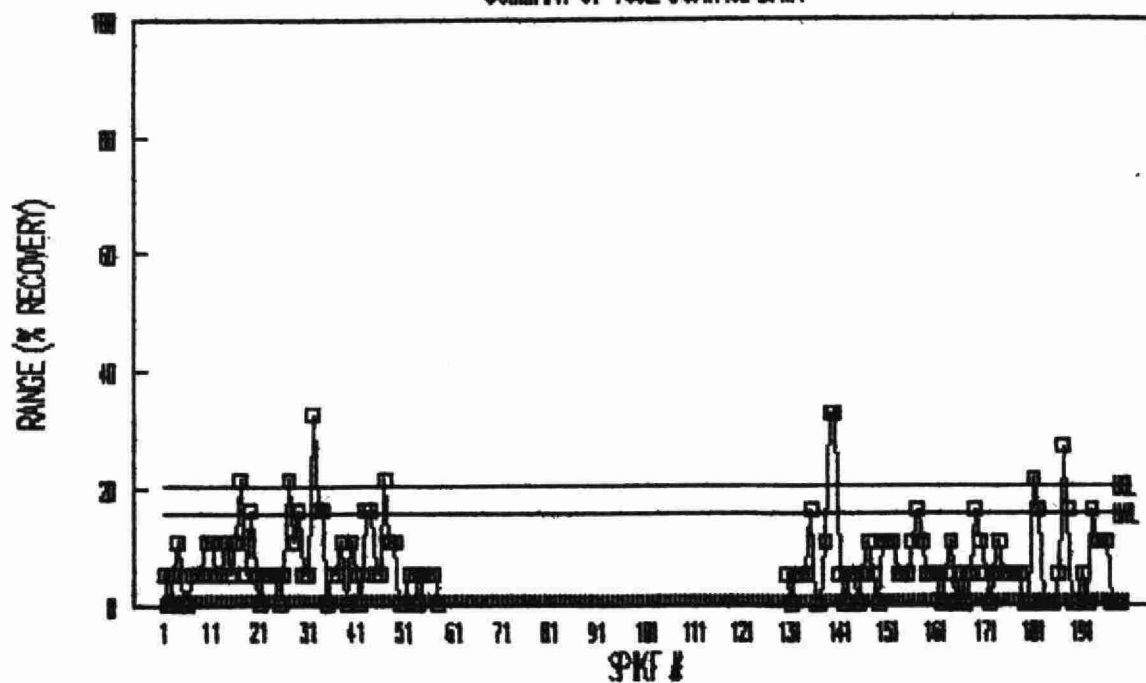
7
MSAVOL:D4C13P (fid)

SUMMARY OF 1992 CONTROL DATA



MSAVOL:D4C13P (fid)

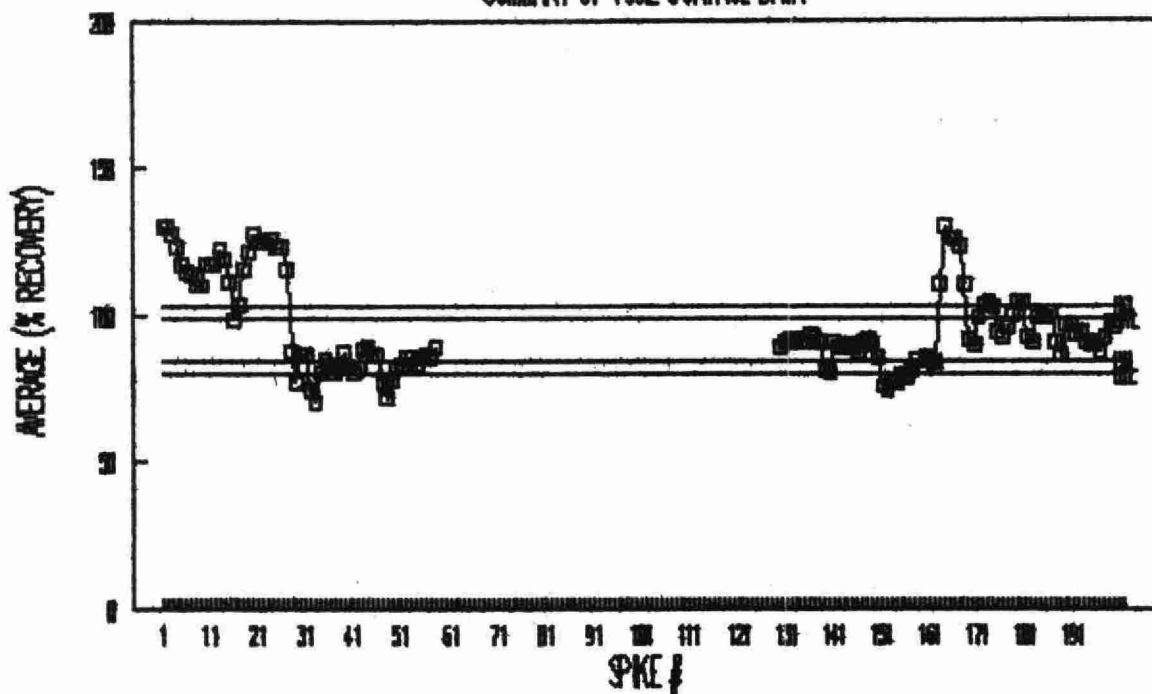
SUMMARY OF 1992 CONTROL DATA



60

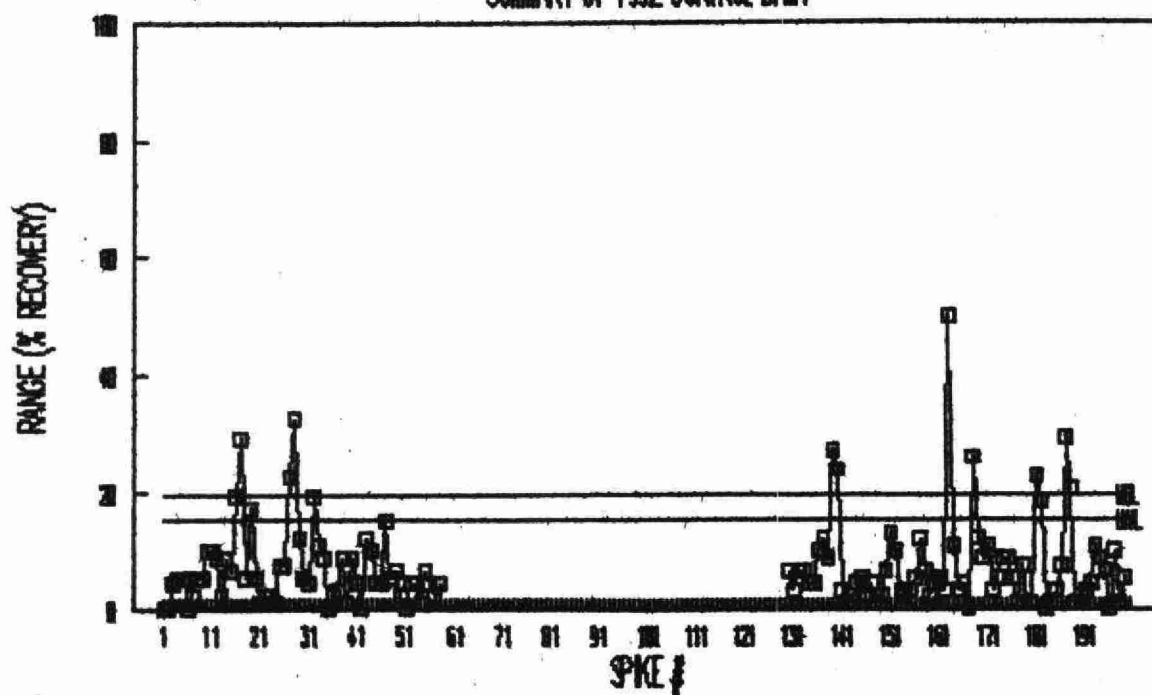
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SUMMARY OF 1992 CONTROL DATA



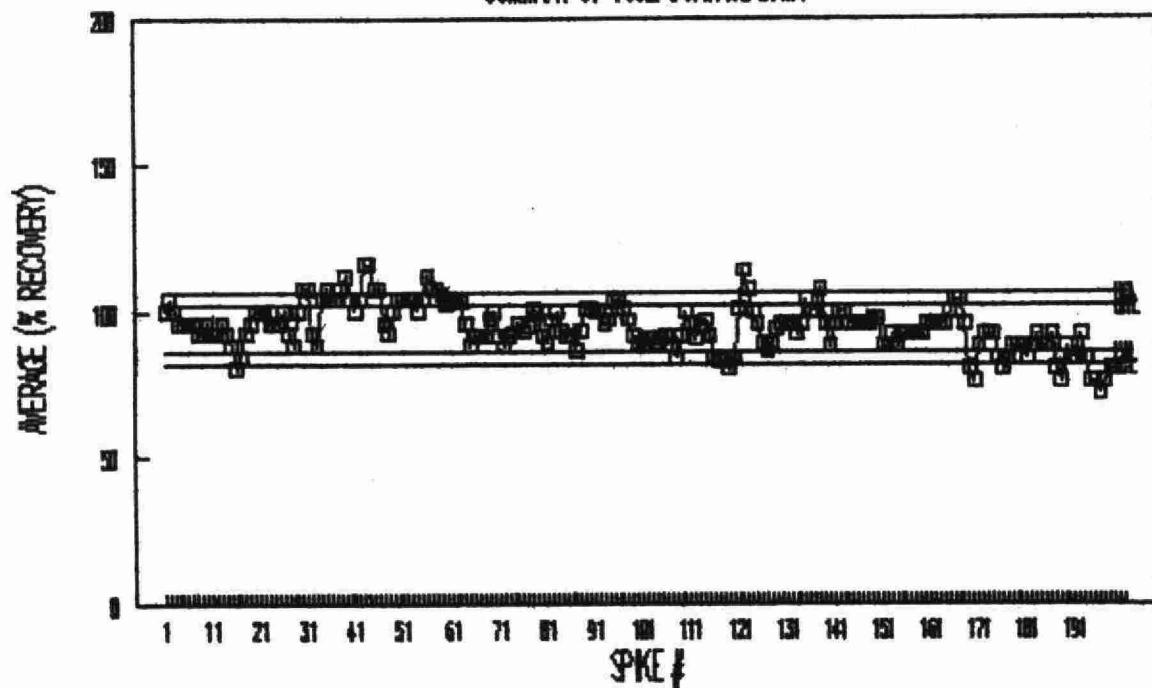
MSAVOL:D4C13P (ecd)

SUMMARY OF 1992 CONTROL DATA



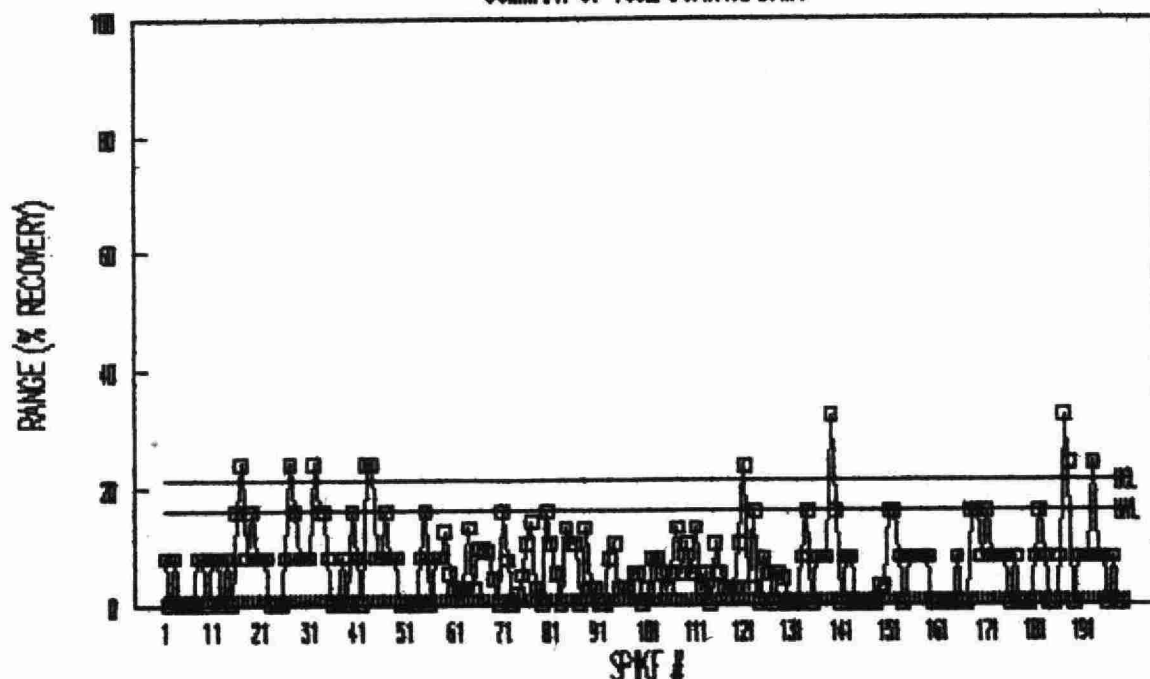
MSAVOL:D3112T (fid)

SUMMARY OF 1992 CONTROL DATA



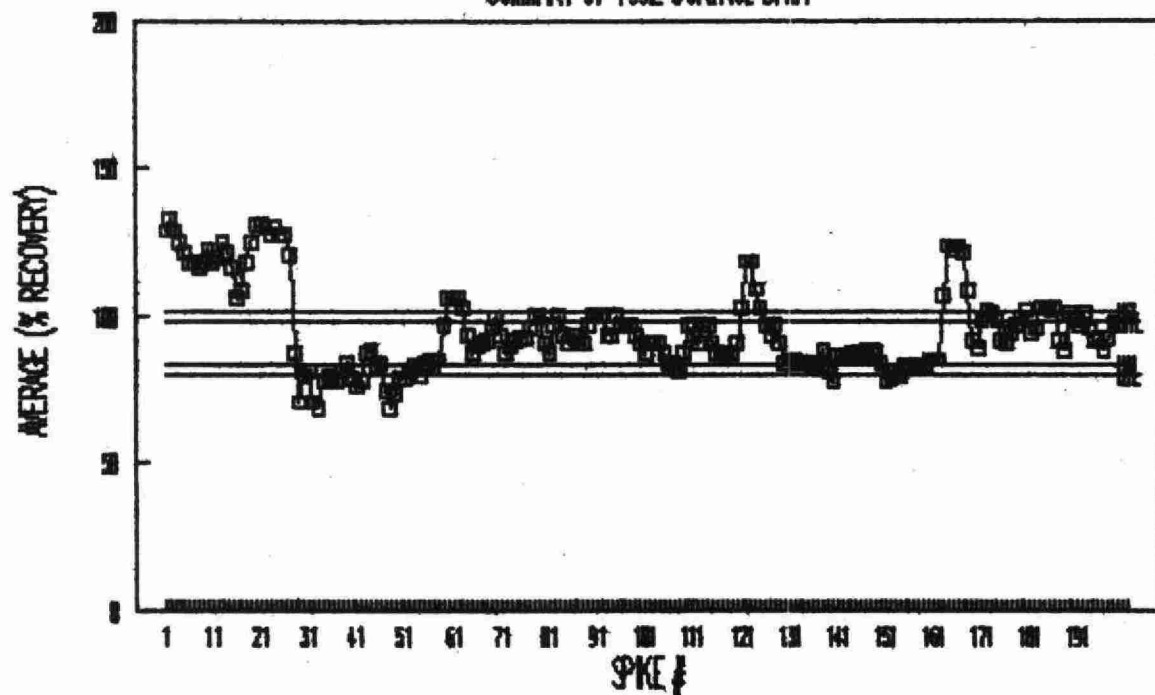
MSAVOL:D3112T (fid)

SUMMARY OF 1992 CONTROL DATA



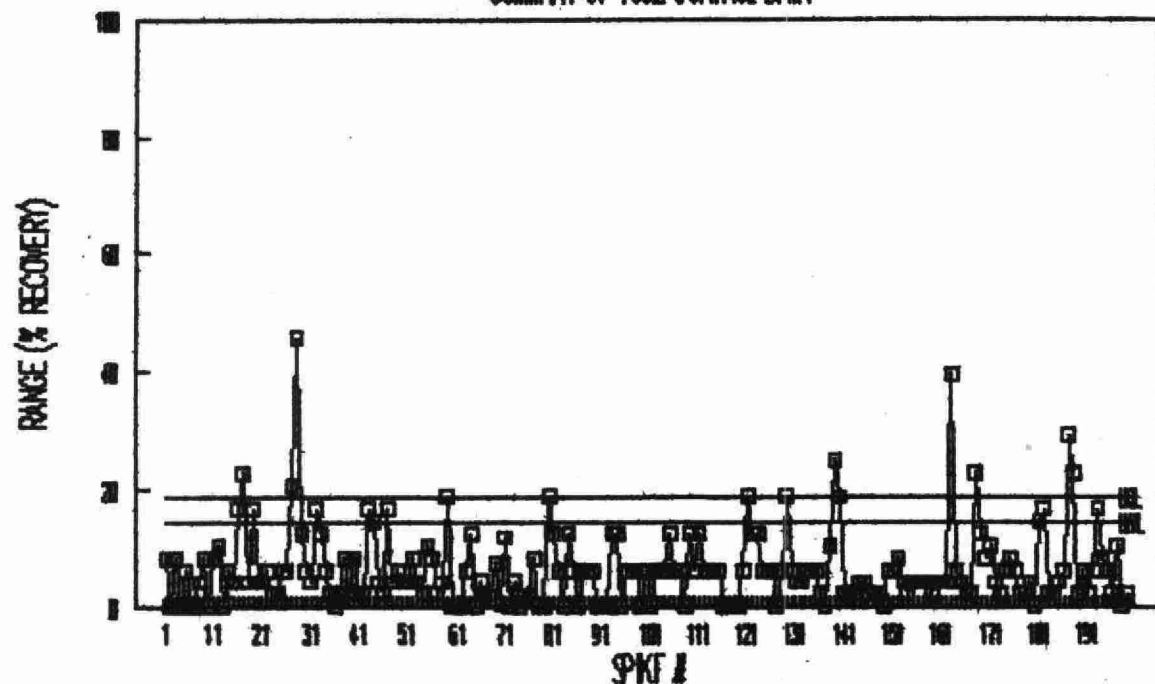
MSAVOL:D3112T (ecd)

SUMMARY OF 1992 CONTROL DATA



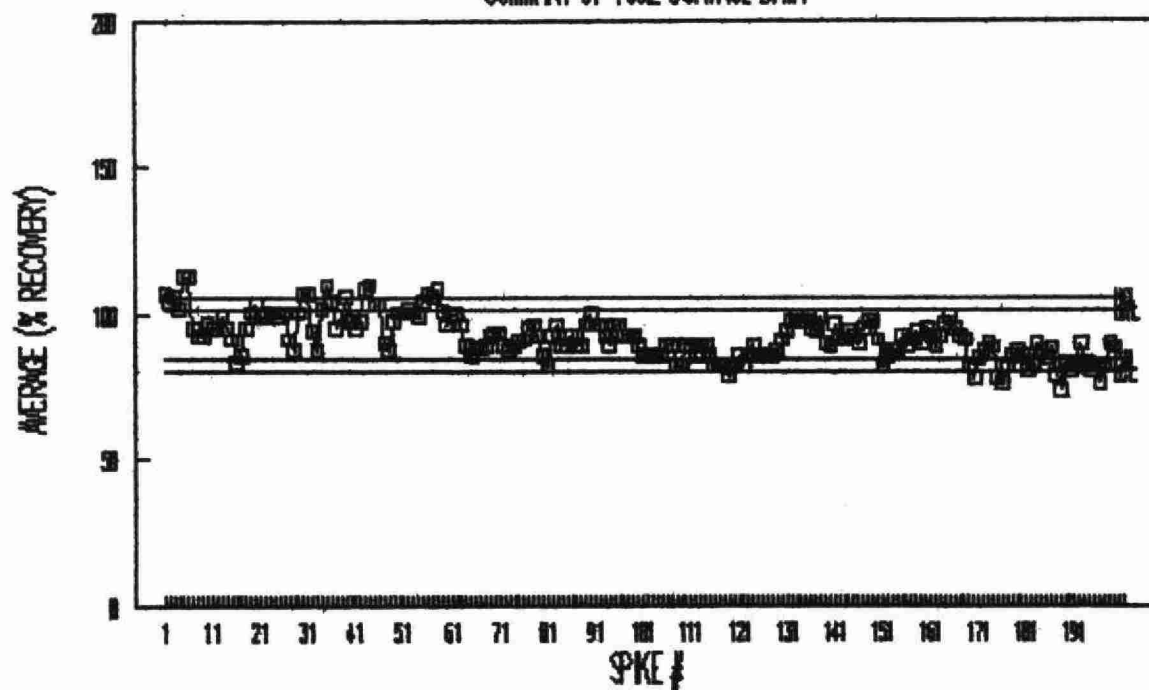
MSAVOL:D3112T (ecd)

SUMMARY OF 1992 CONTROL DATA



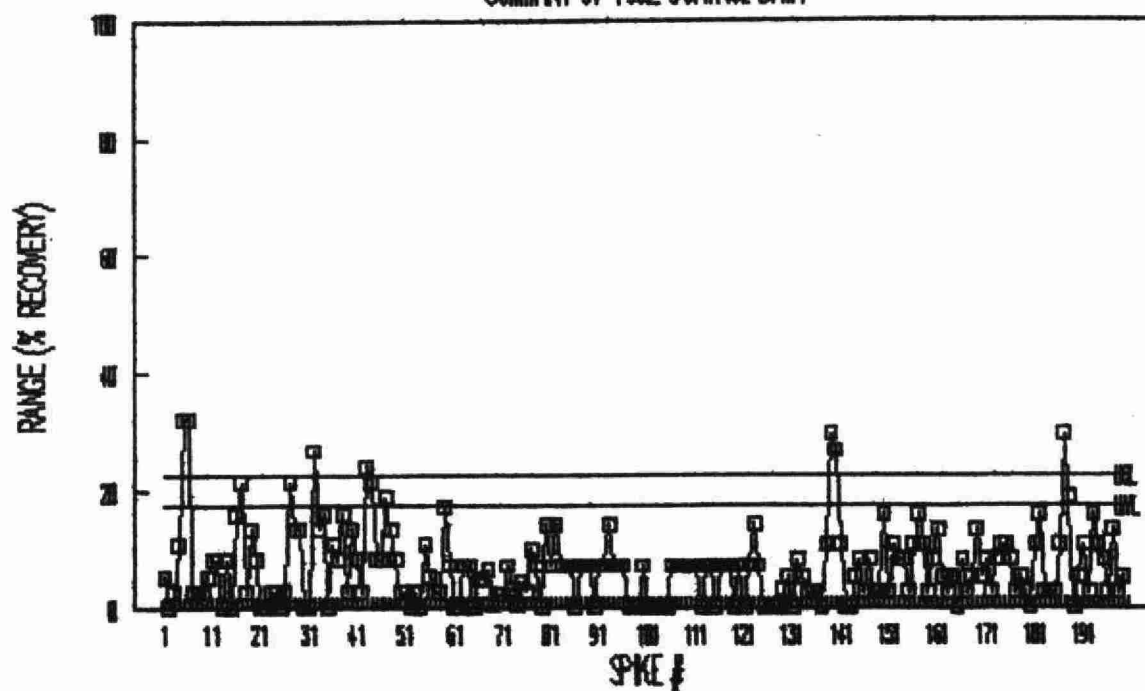
MSAVOL:D100XY (fid)

SUMMARY OF 1992 CONTROL DATA



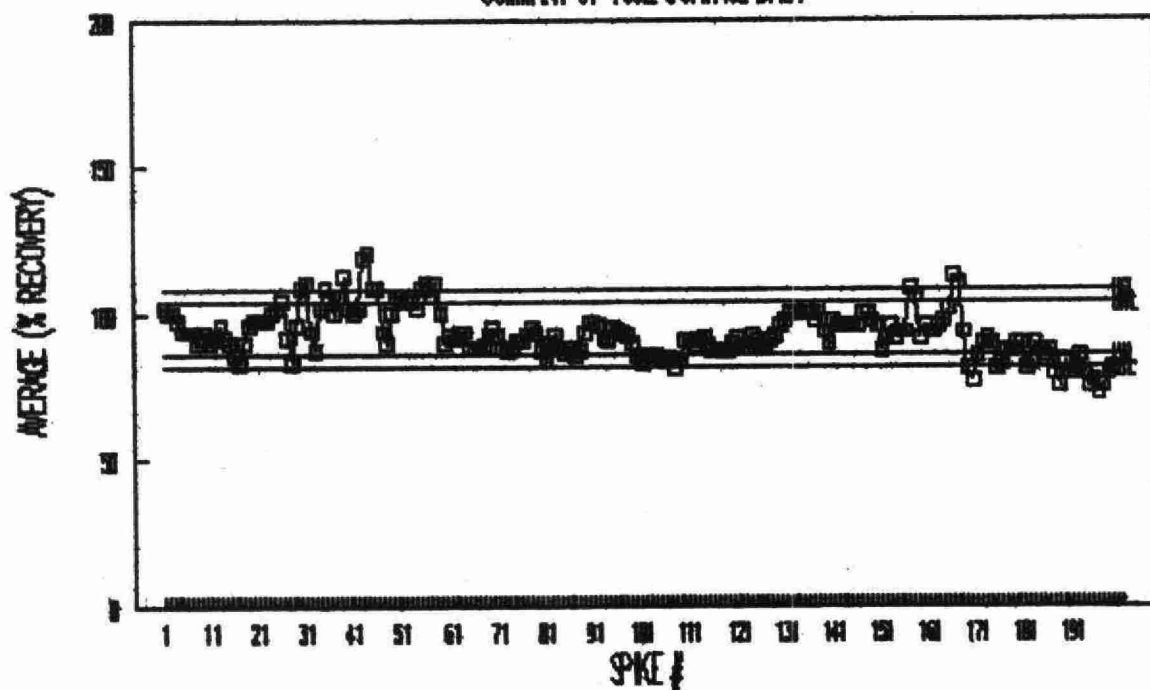
MSAVOL:D100XY (fid)

SUMMARY OF 1992 CONTROL DATA



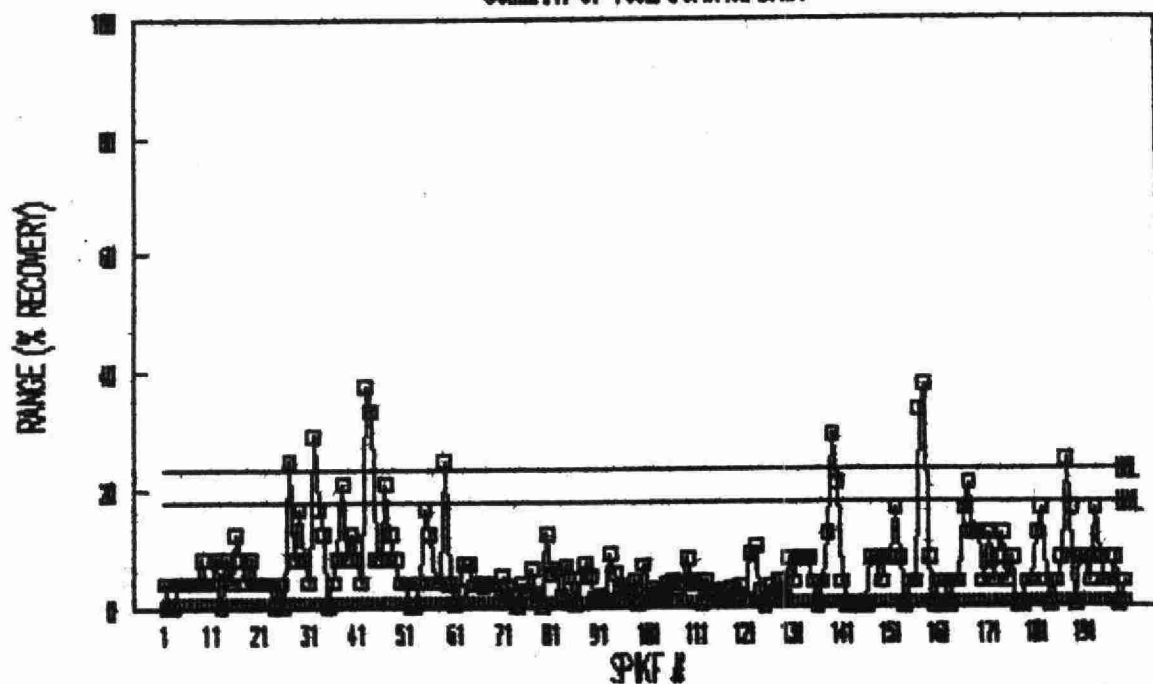
MSAVOL:D40DCB (fid)

SUMMARY OF 1992 CONTROL DATA



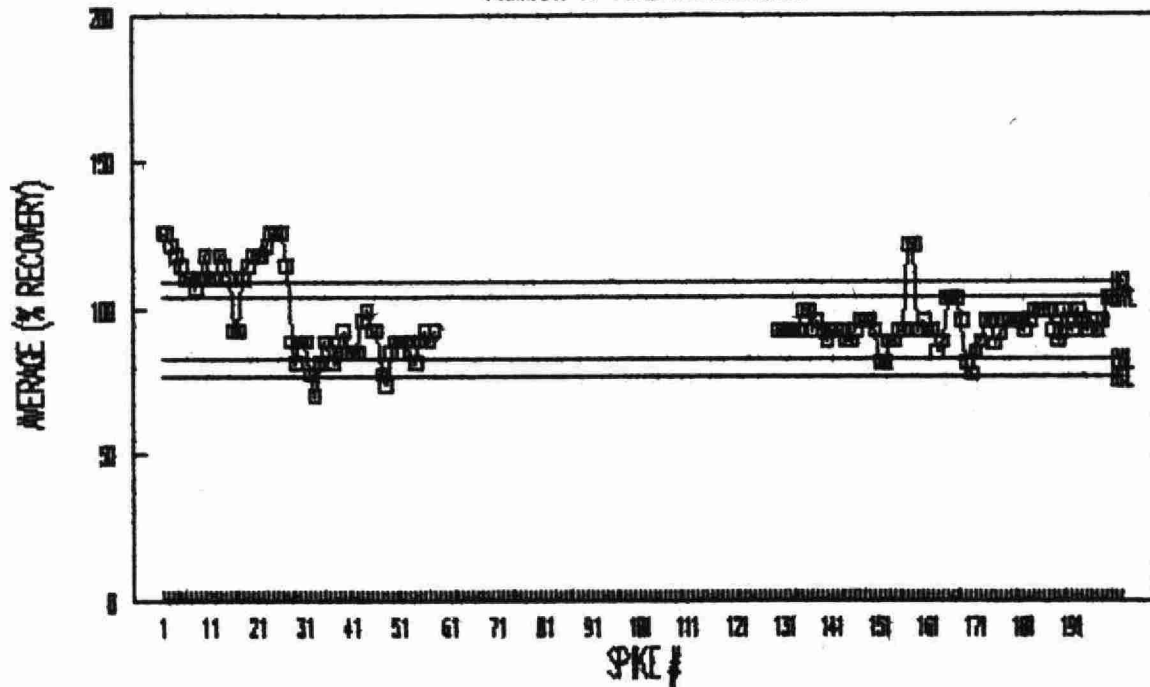
MSAVOL:D40DCB (fid)

SUMMARY OF 1992 CONTROL DATA



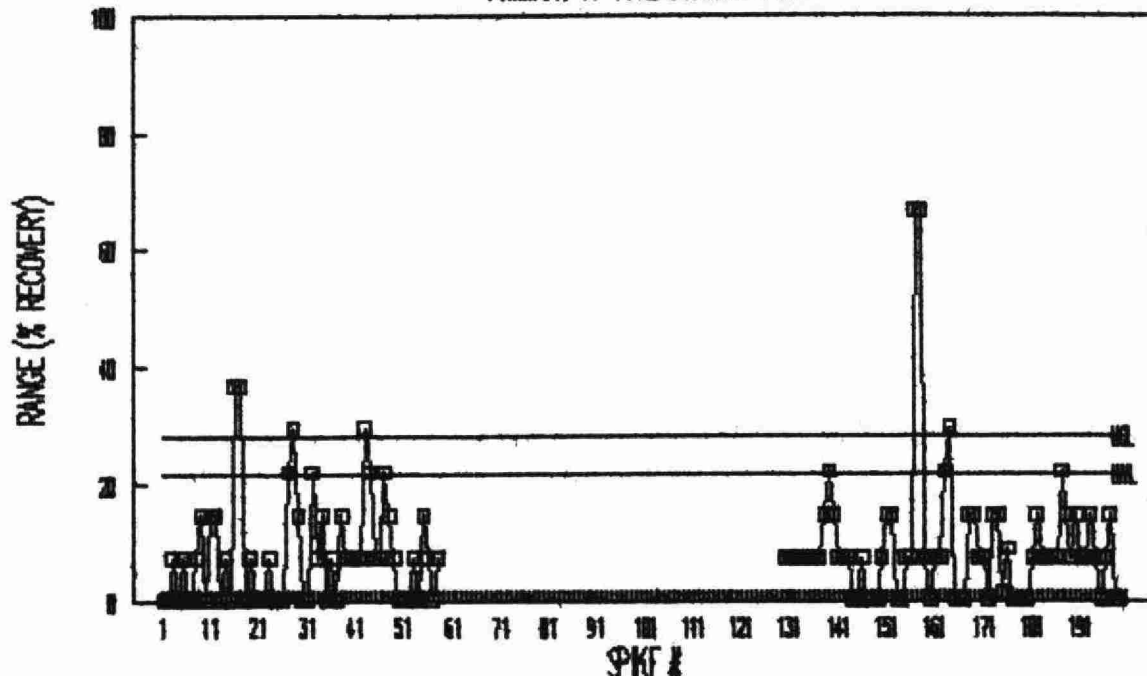
MSAVOL:D40DCB (ecd)

SUMMARY OF 1992 CONTROL DATA



MSAVOL:D40DCB (ecd)

SUMMARY OF 1992 CONTROL DATA



ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: PWRFA-E3166A

SAMPLE TYPE: WATER/EFFLUENT

UNIT: WASTEWATER

SUPERVISOR: YVONNE JONES

PRINCIPLE OF METHOD :

Resin acids are derived from the natural resins found in the wood of coniferous trees. They are released into receiving waters from any softwood tree processing.

A measured volume of sample, typically 100 mL, is funnel extracted at pH 9 with two separate portions of methyl-t-butyl ether having a volume equal to that of the sample. The acids present in the concentration final extract are converted to their methyl ester using diazomethane as the derivatizing agent. After concentration of the methylated extract, the methyl ester derivatives of the resin and fatty acids are determined by Dual Capillary Gas Chromatography and Flame Ionization Detectors (FID).

PARAMETERS MEASURED:

This method covers the determination of certain resin and fatty acids listed below:

Parameter

Test Code

Fatty:

1. Capric	(CAP) *	PFCAP
2. Lauric	(LAU)	PFLAU
3. Myristic	(MYR)	PFMYR
4. Palmitic	(PALM)	PFPAL
5. Stearic	(STE)	PFSTE
6. Oleic	(OLE)	PFOLE
7. Linoleic	(LIN)	PFLIN
8. Linolenic	(LINN)	PFLINN
9. Arachidic	(ARA)	PFARA
10. Dichlorostearic	(CLST)	PFCLST

Resin:

1. Pimaric	(PIM)	PRPIM
2. Sandaracopimaric	(SAN)	PRSAM
3. Isopimaric	(ISO)	PRISO
4. Palustric ***	(PAL)	PRPAL***
5. Levopimaric***	(LEV)	PRLEV***
6. Abietic	(ABI)	PRABI

7. Neoabiatic	(NEO)	PRNEO
8. Dehydroabiatic	(DEHA)	PRDEHA
9. Chlorodehydroabiatic**	(CLDA)	PRCLDA
10. Dichlorodehydroabiatic	(DCDA)	PRDCDA

* A shorthand notation for each parameter is given in brackets.

** Sum of two isomers; 12-and 14- chlorodehydroabiatic.

*** Reported as a sum; LIS remark code 'PIT'.

REPORTING RESULTS:

Results are reported in ug/L.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC samples.

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

The same injection solvent must be used for both the Calibration Standard and the samples.

Because of the difficulty in obtaining high purity Standards for all of the resin acids and the instability of some of the resin acids, it was decided to apply the response factor for dehydroabiatic acid, a relatively pure and stable resin acid, to all of the other resin acids (and fatty acids).

It is important for the analysts to verify the performance of the column used because of inconsistency with respect to the ability of suppliers columns to achieve a separation of the RFA analytes.

Matrix interferences may be caused by contaminants that are co-extracted from the sample.

Method interferences may be caused by contaminants in solvents, reagents, glassware, and any other sample processing hardware that may lead to discrete artifacts in gas chromatography.

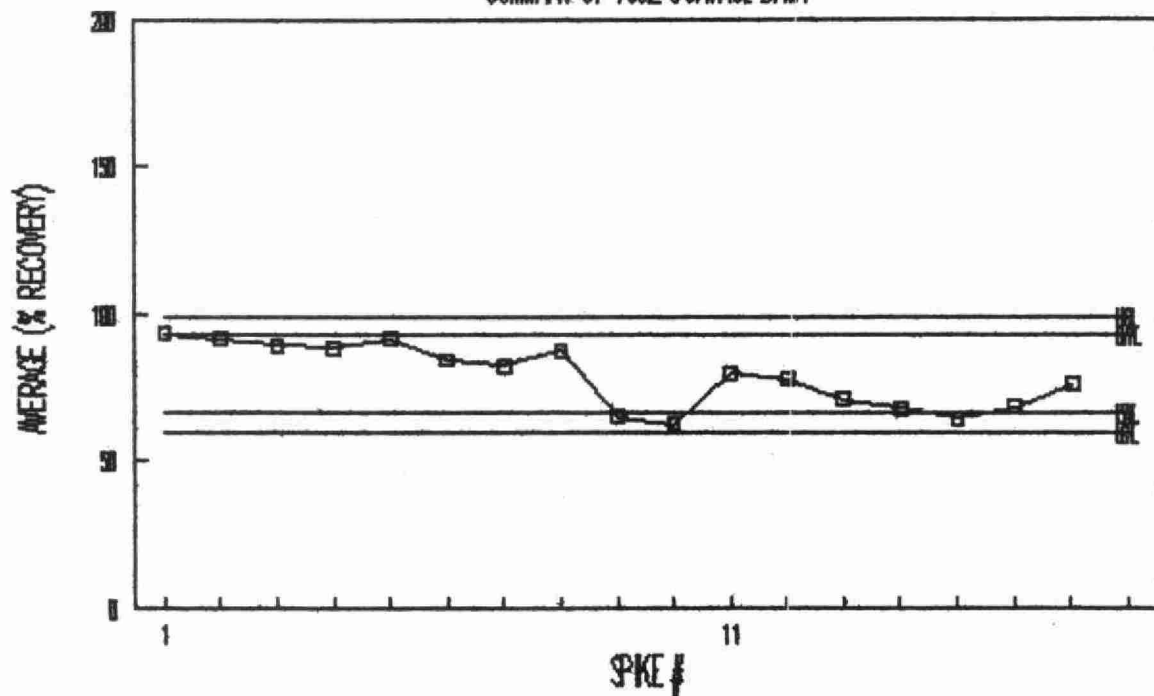
UNIT: WASTEWATER -E3166A MATRIX: Water
 WORKSTATION: PWRFA - HP INSTRUMENT: GC
 TIME PERIOD: JAM.-DEC. 1992 NO. OBSERVATIONS: 17

YEARLY CALCULATION

PARAMETER COMPOUND	CONC.	AVG. SPK. % REC.	STD. DEV. % REC.	% C.V.
1. CAPRIC	: 500	: 79.51	: 12.99	: 16.34
2. LAURIC	: 500	: 92.76	: 7.56	: 8.15
3. MYRISTIC	: 500	: 94.28	: 12.23	: 12.97
4. PALMITIC	: 500	: 100.21	: 15.21	: 11.18
5. LINOLEIC	: 500	: 90.05	: 11.97	: 13.29
6. LINOLENIC	: 500	: 89.34	: 12.86	: 14.39
7. OLEIC	: 1000	: 91.95	: 12.61	: 13.72
8. STEARIC	: 1000	: 91.99	: 12.63	: 13.73
9. PIMARIC	: 500	: 90.98	: 12.16	: 13.37
10.SANDIMARIC	: 500	: 90.27	: 11.74	: 13.01
11.ISOPIMARIC	: 500	: 90.85	: 12.34	: 13.58
12.PALUSTR	: 500	: 79.43	: 12.24	: 15.41
13.LEVOPIM *	: 500	: 99.19	: 32.54	: 66.15
14.DHABIETIC	: 500	: 99.44	: 16.77	: 16.86
15.ARACHIDIC	: 500	: 85.54	: 12.27	: 14.35
16.ABIETIC	: 500	: 86.09	: 30.90	: 35.90
17.NEOABIETIC	: 500	: 69.54	: 13.62	: 19.59
18.DICLSTEARIC	: 500	: 90.40	: 14.68	: 16.24
19.CLDHABIETIC	: 500	: 97.50	: 24.63	: 25.26
20.DICLDHABIETIC	: 500	: 91.27	: 15.64	: 17.13
21.% OMP	: 500	: 93.86	: 13.21	: 14.07

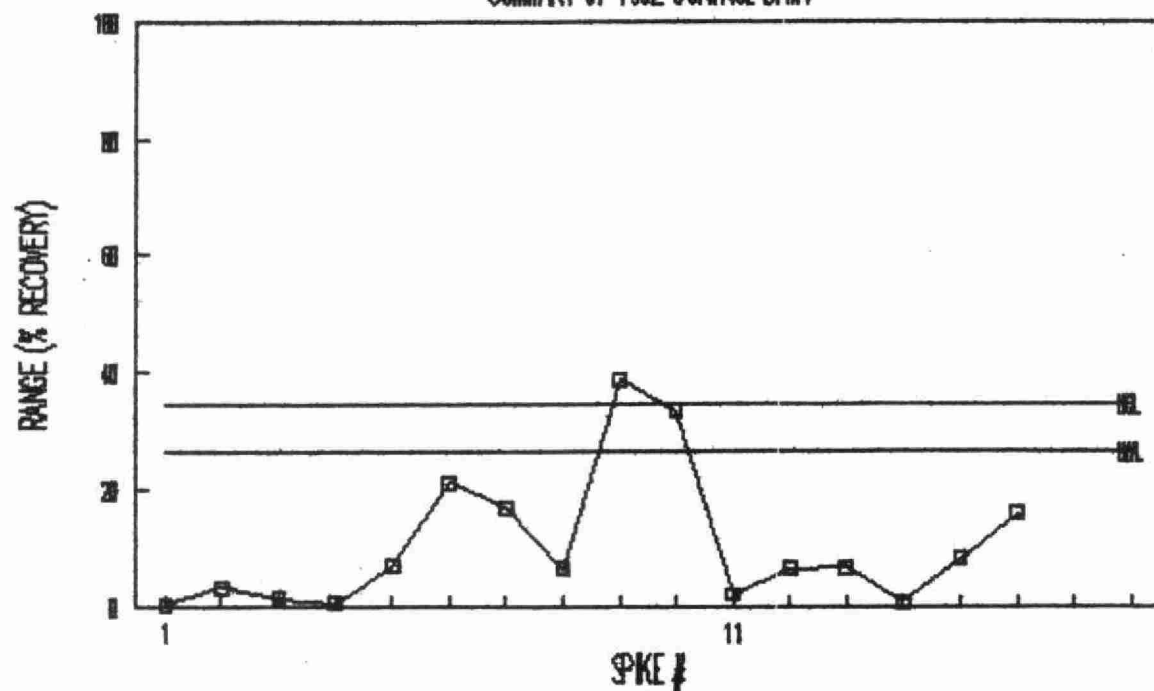
PWRFA: CAPRIC(hp)

SUMMARY OF 1992 CONTROL DATA



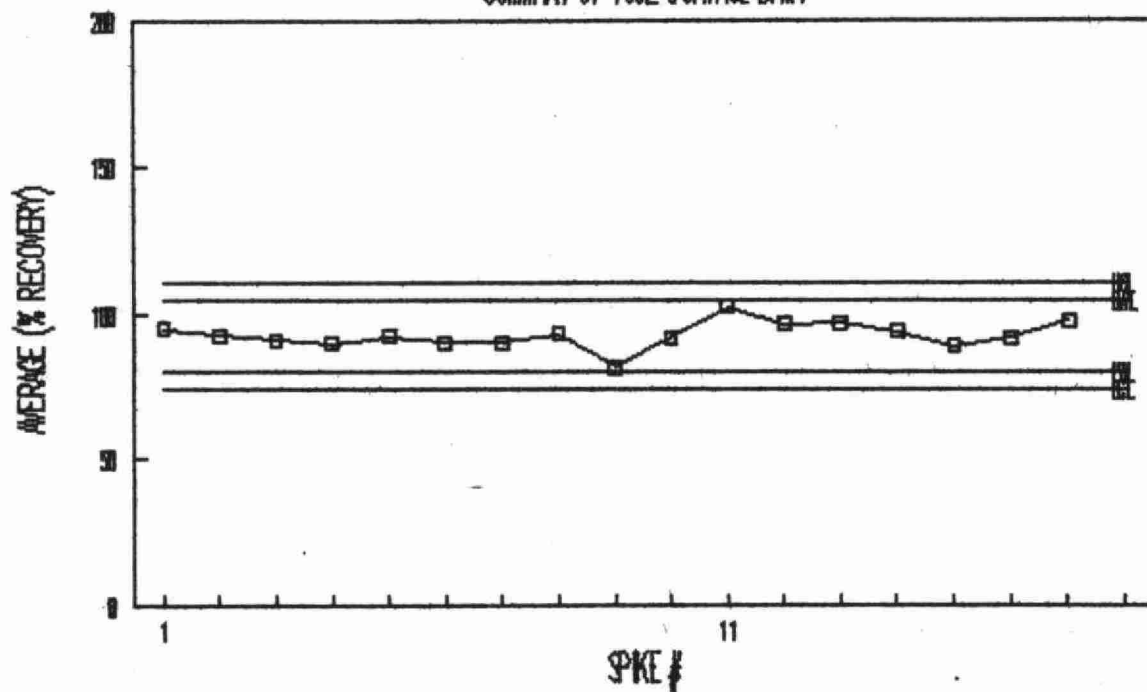
PWRFA: CAPRIC(hp)

SUMMARY OF 1992 CONTROL DATA



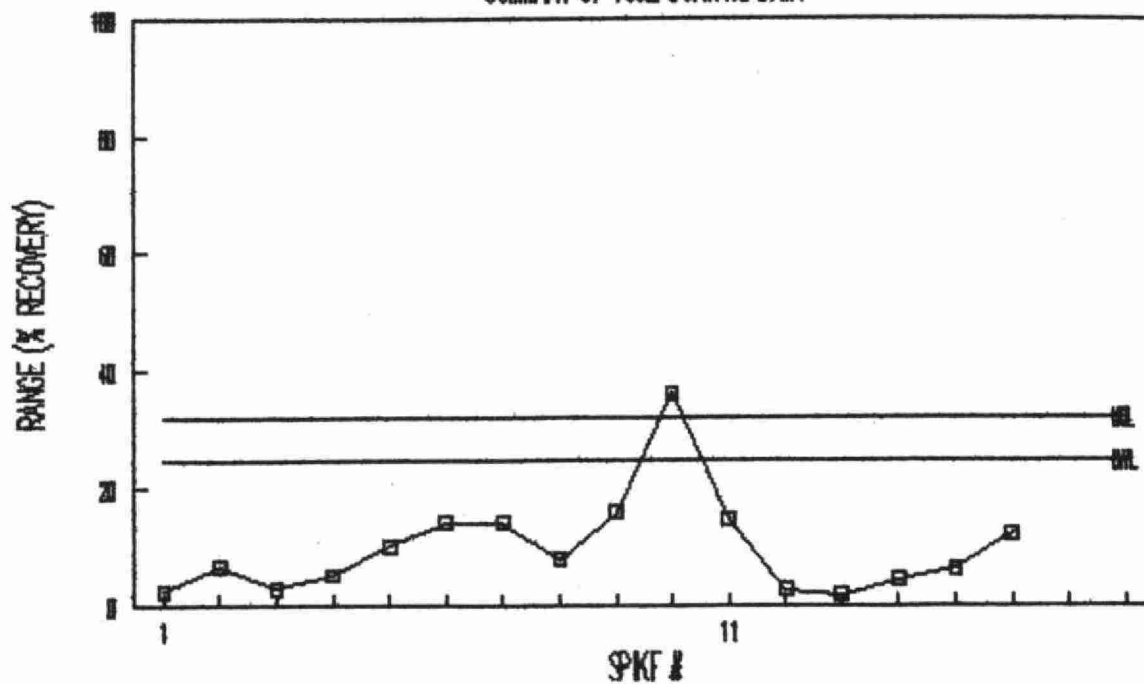
PWRFA: LAURIC(hp)

SUMMARY OF 1992 CONTROL DATA



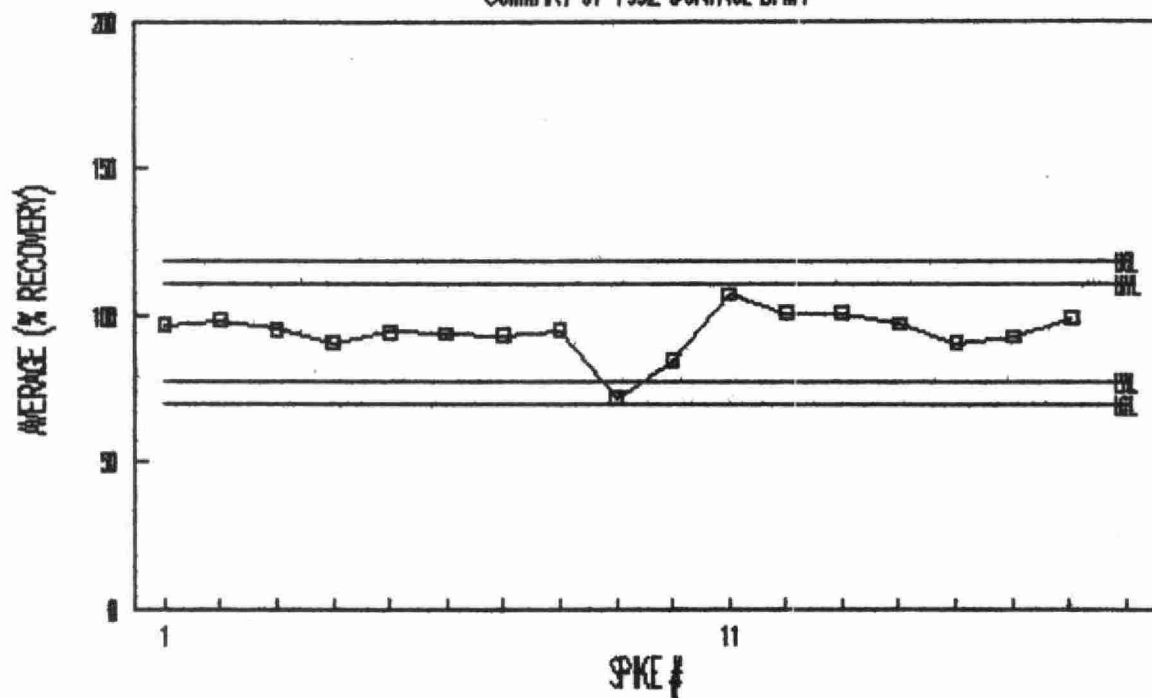
PWRFA: LAURIC(hp)

SUMMARY OF 1992 CONTROL DATA



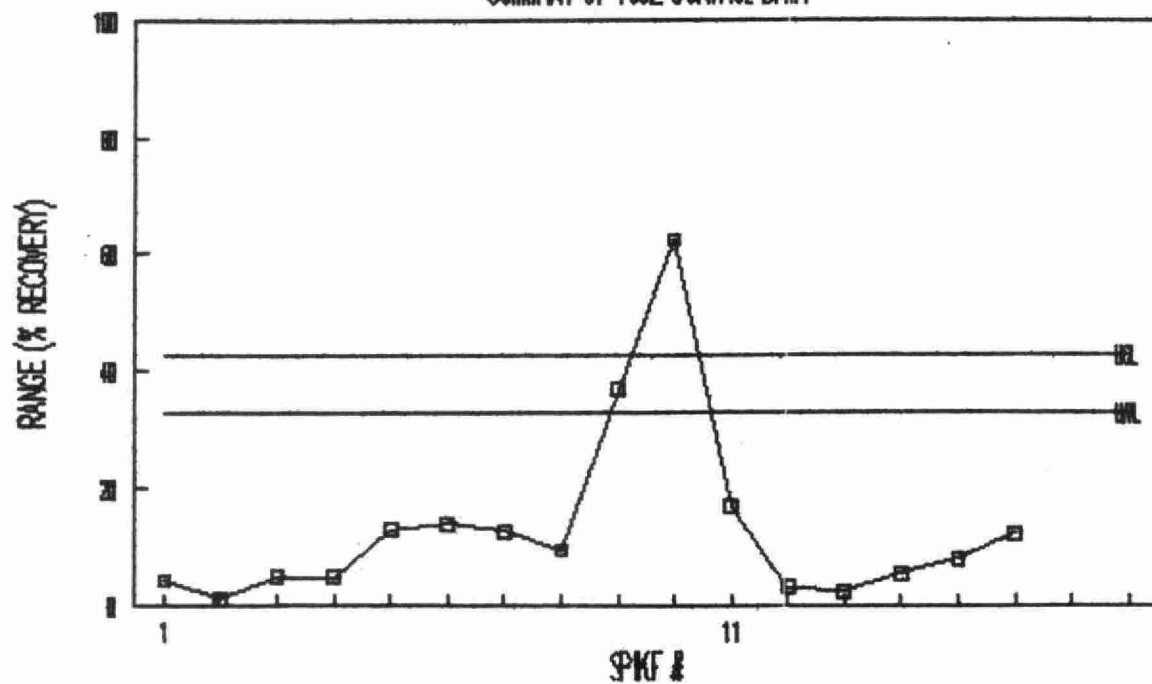
PWRFA: MYRIST(hp)

SUMMARY OF 1992 CONTROL DATA



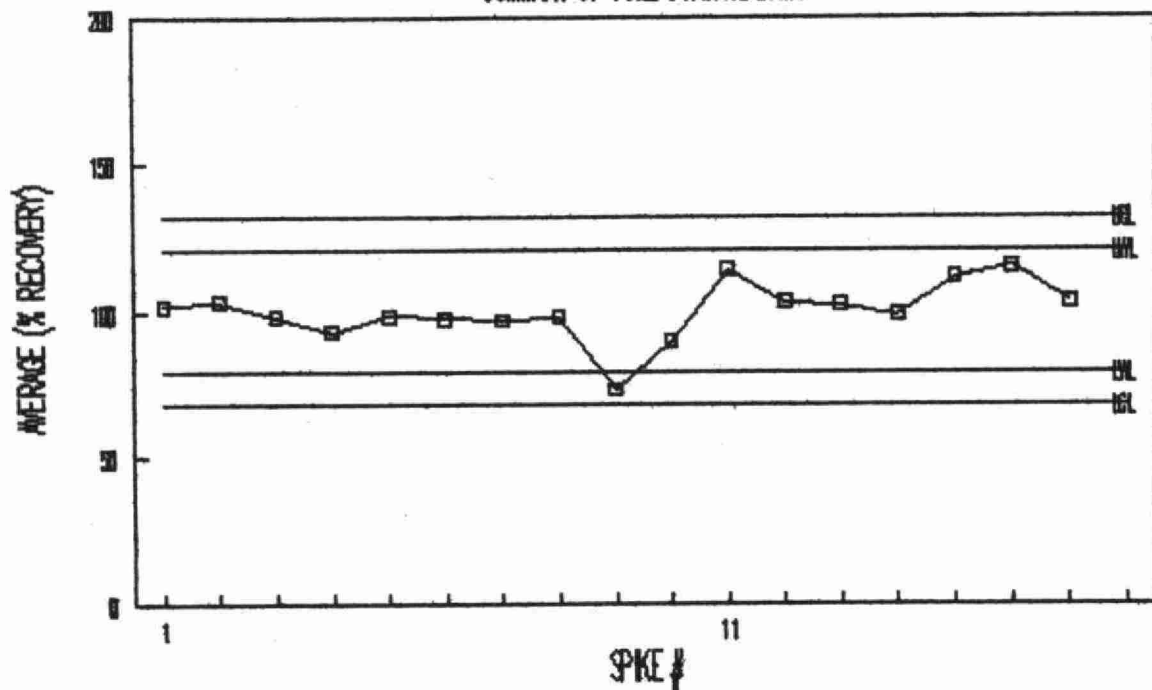
PWRFA: MYRIST(hp)

SUMMARY OF 1992 CONTROL DATA



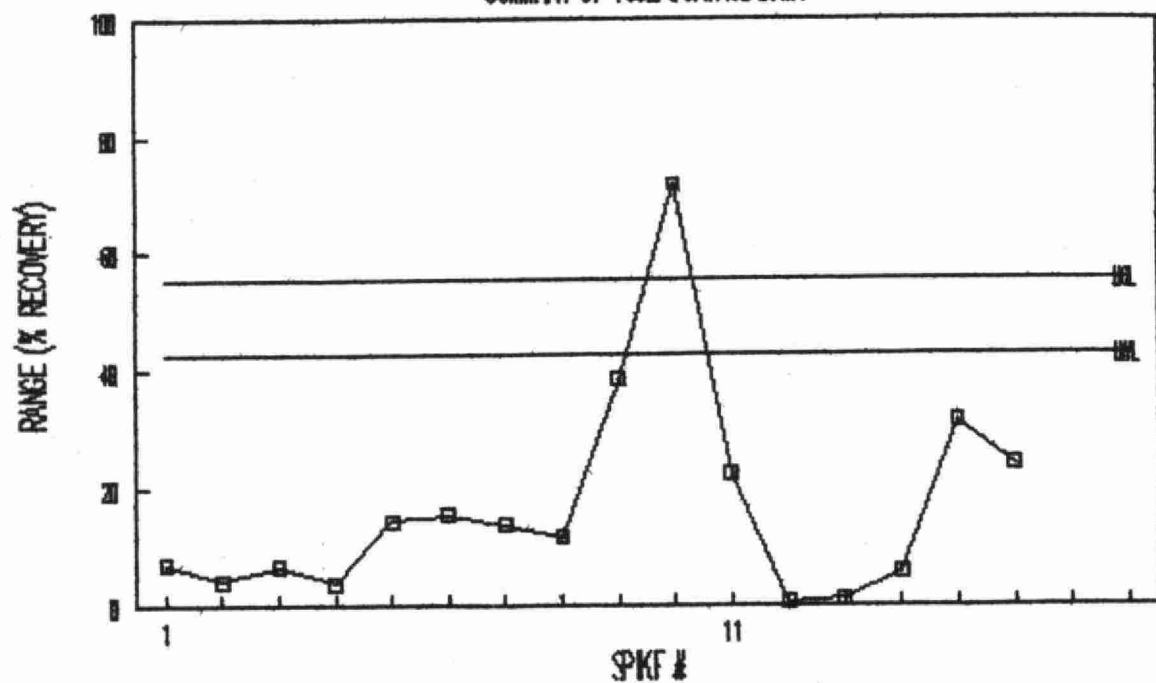
PWRFA: PALMIT(hp)

SUMMARY OF 1992 CONTROL DATA



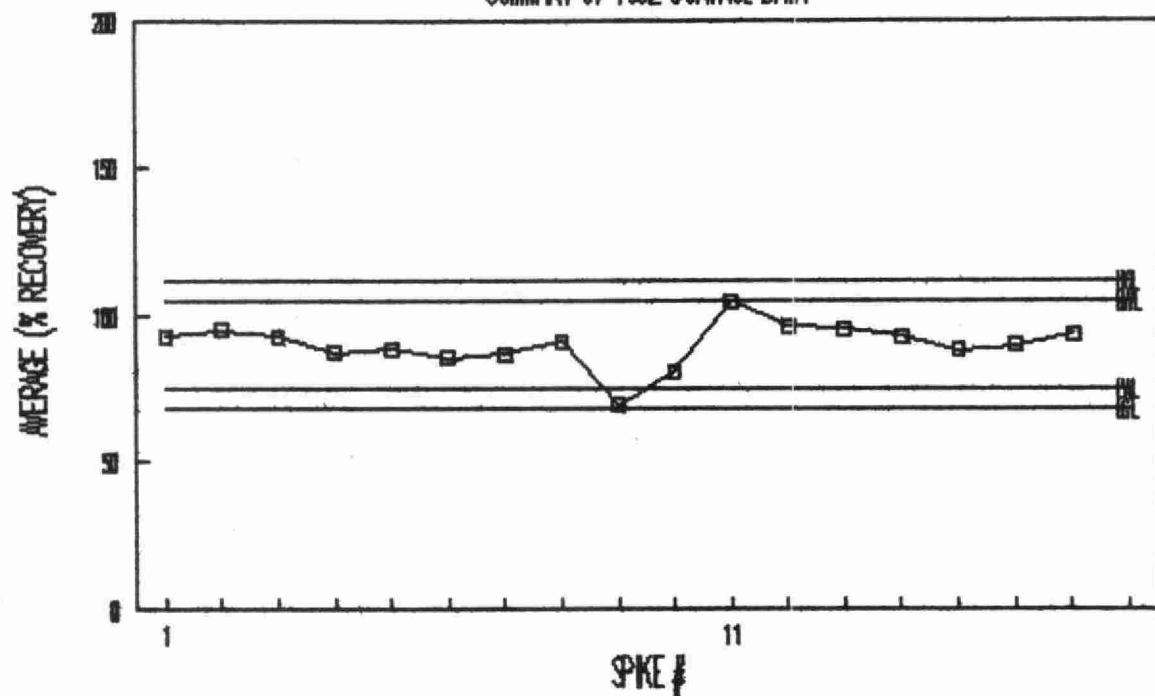
PWRFA: PALMIT(hp)

SUMMARY OF 1992 CONTROL DATA



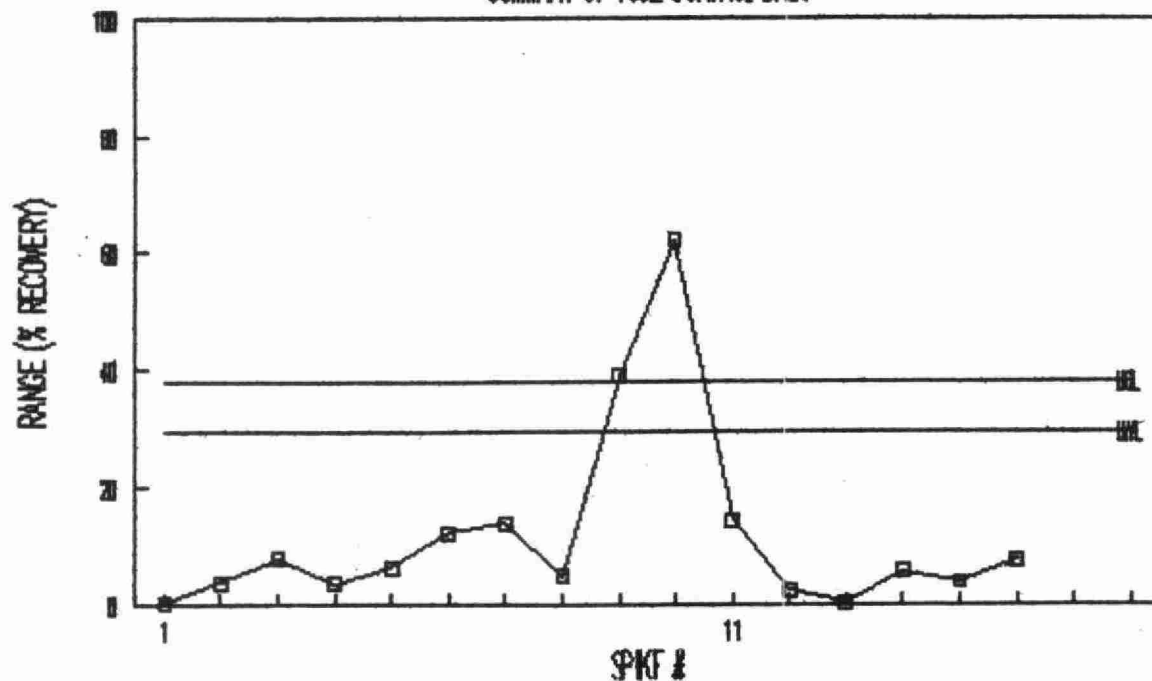
PWRFA: LINOLE(hp)

SUMMARY OF 1992 CONTROL DATA



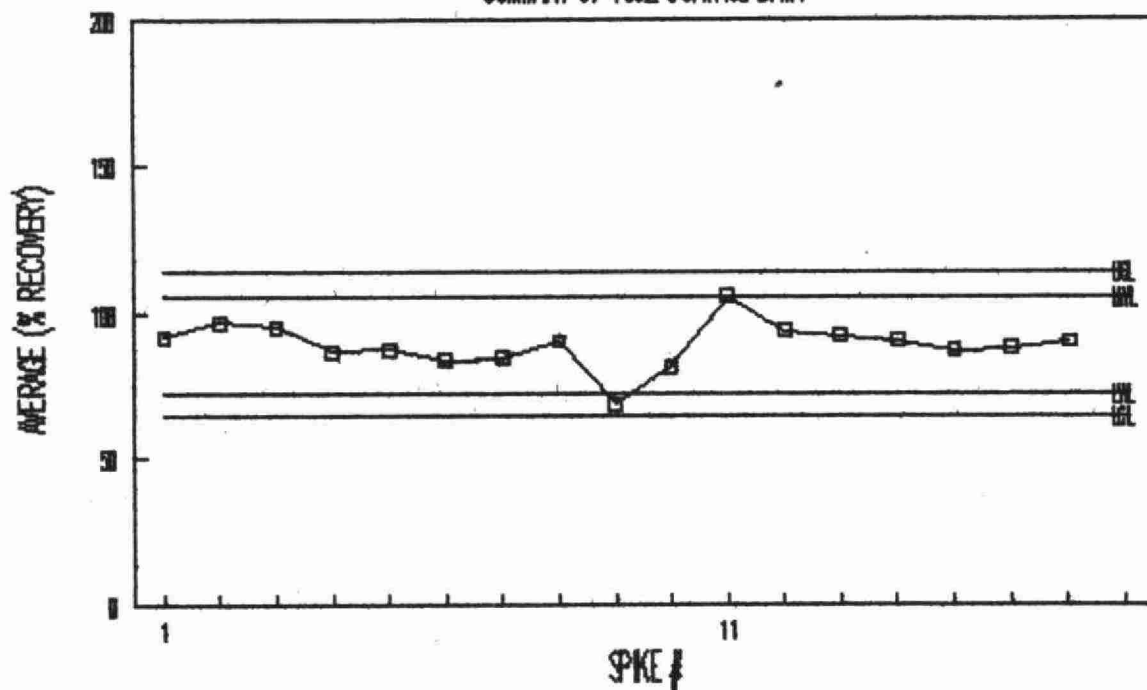
PWRFA: LINOLE(hp)

SUMMARY OF 1992 CONTROL DATA



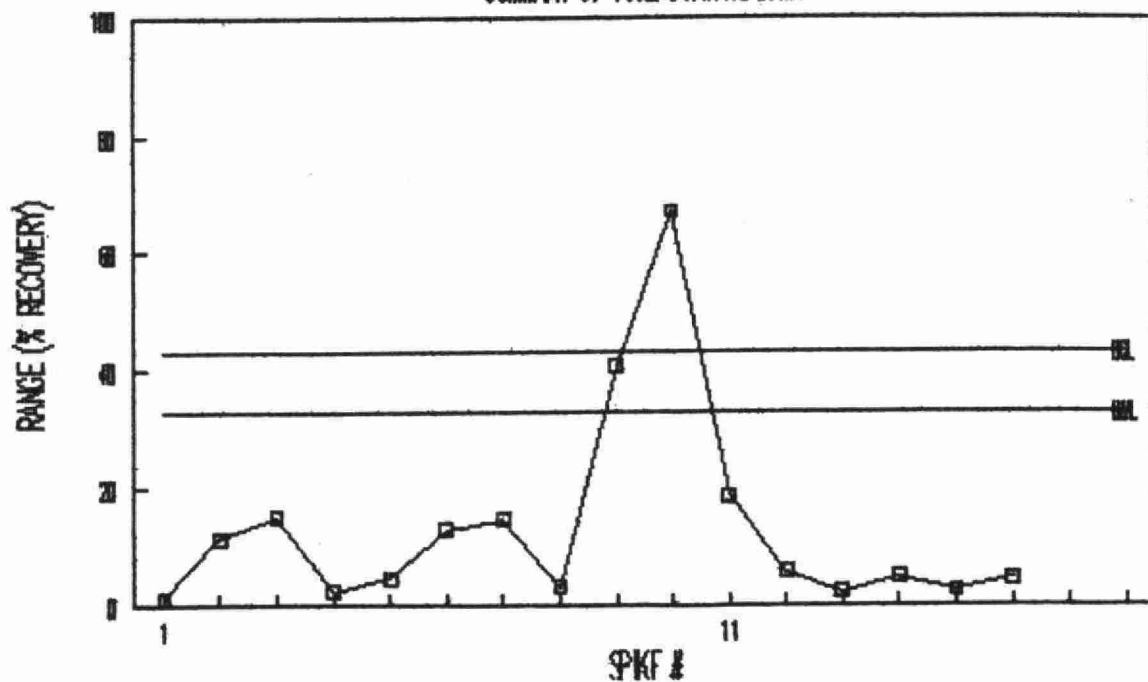
PWRFA: LINOLN(hp)

SUMMARY OF 1992 CONTROL DATA



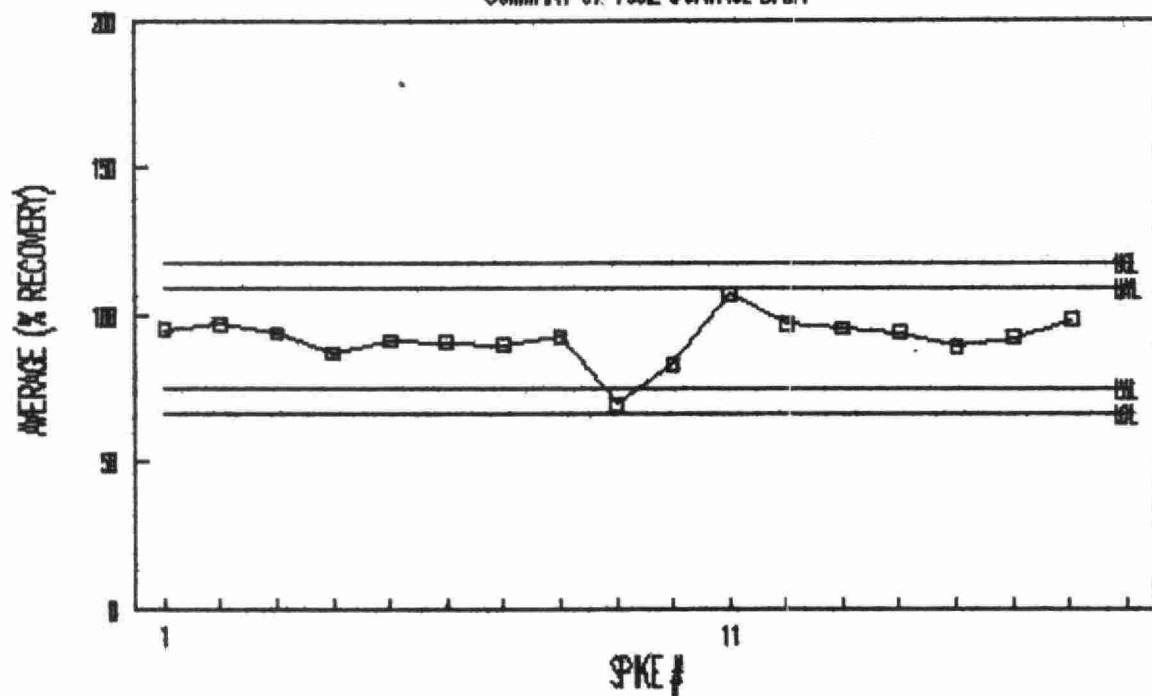
PWRFA: LINOLN(hp)

SUMMARY OF 1992 CONTROL DATA



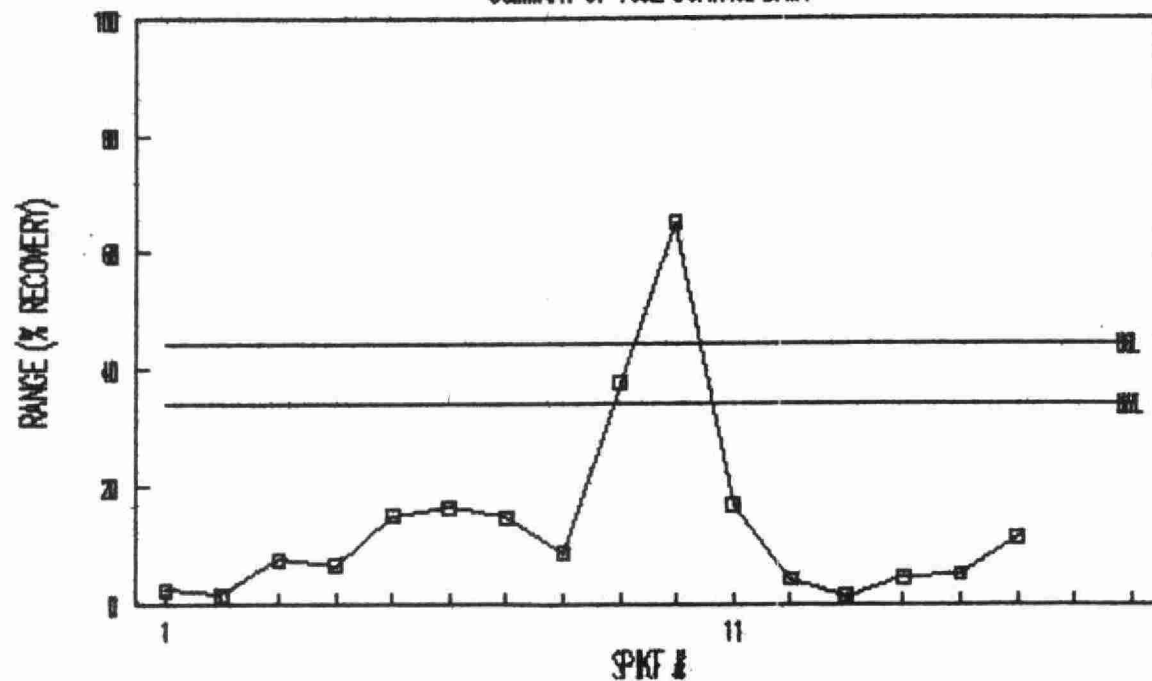
PWRFA: OLEIC(hp)

SUMMARY OF 1992 CONTROL DATA



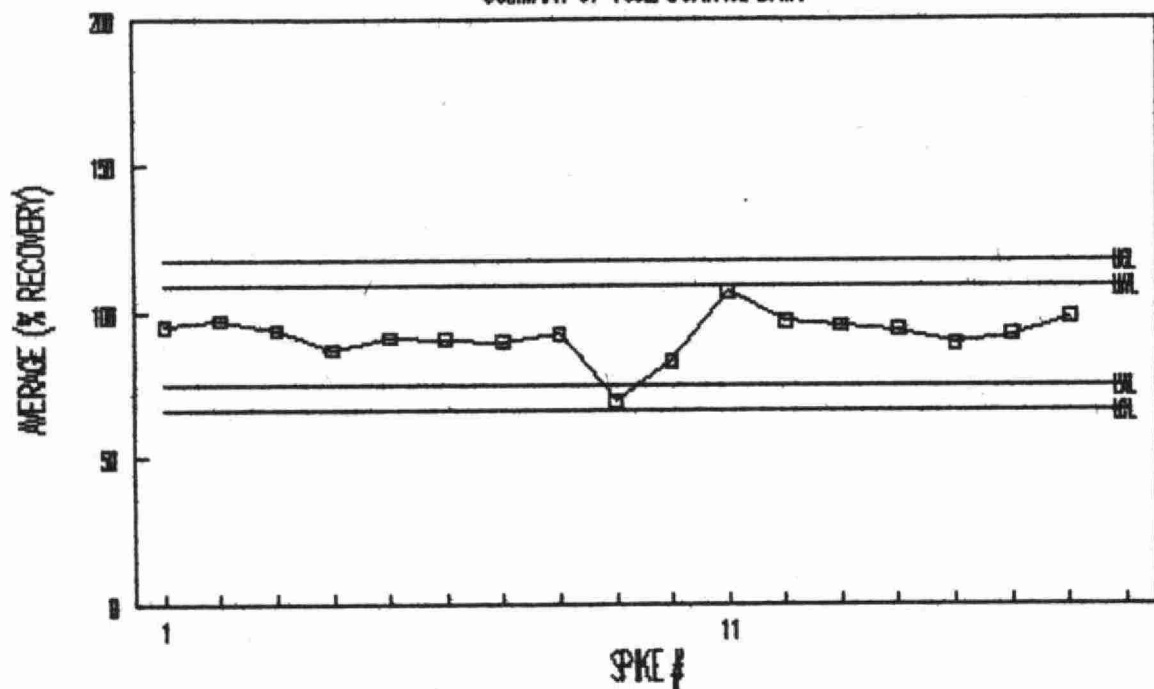
PWRFA: OLEIC(hp)

SUMMARY OF 1992 CONTROL DATA



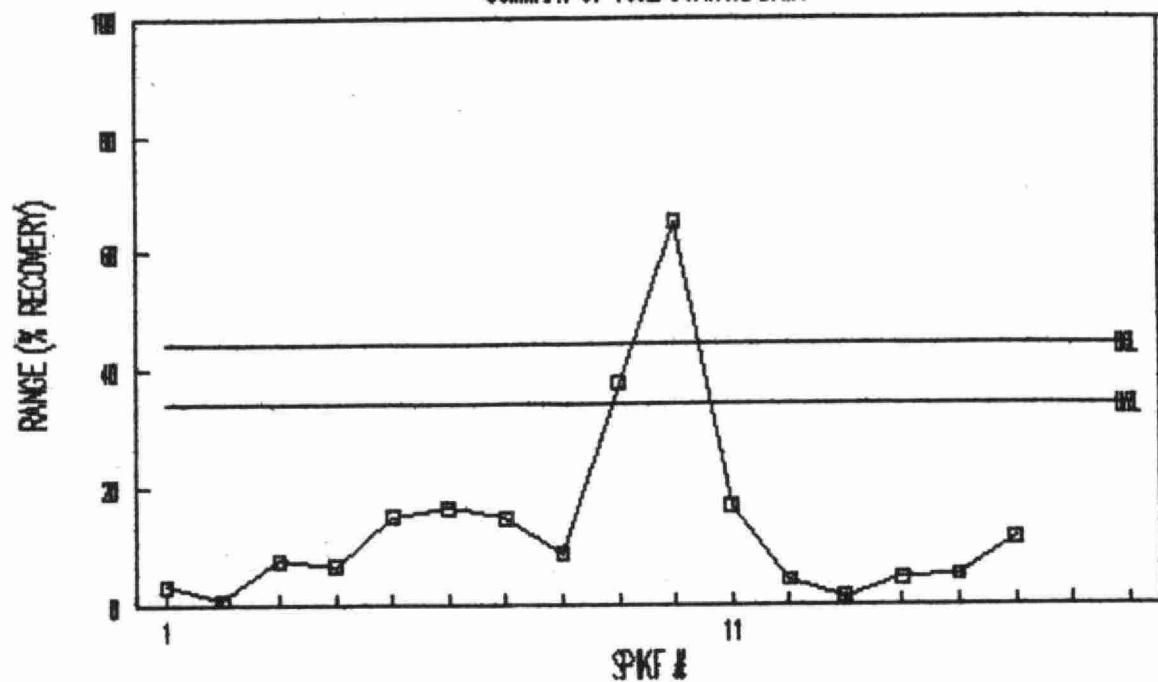
PWRFA: STEAR(hp)

SUMMARY OF 1992 CONTROL DATA



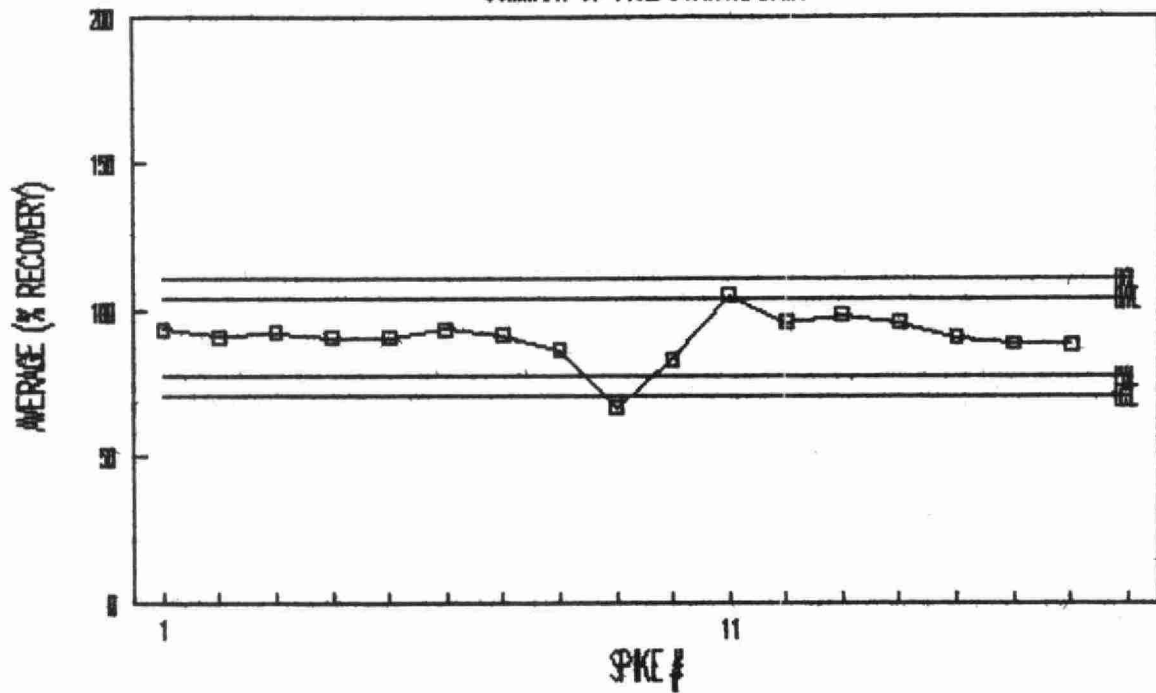
PWRFA: STEAR(hp)

SUMMARY OF 1992 CONTROL DATA



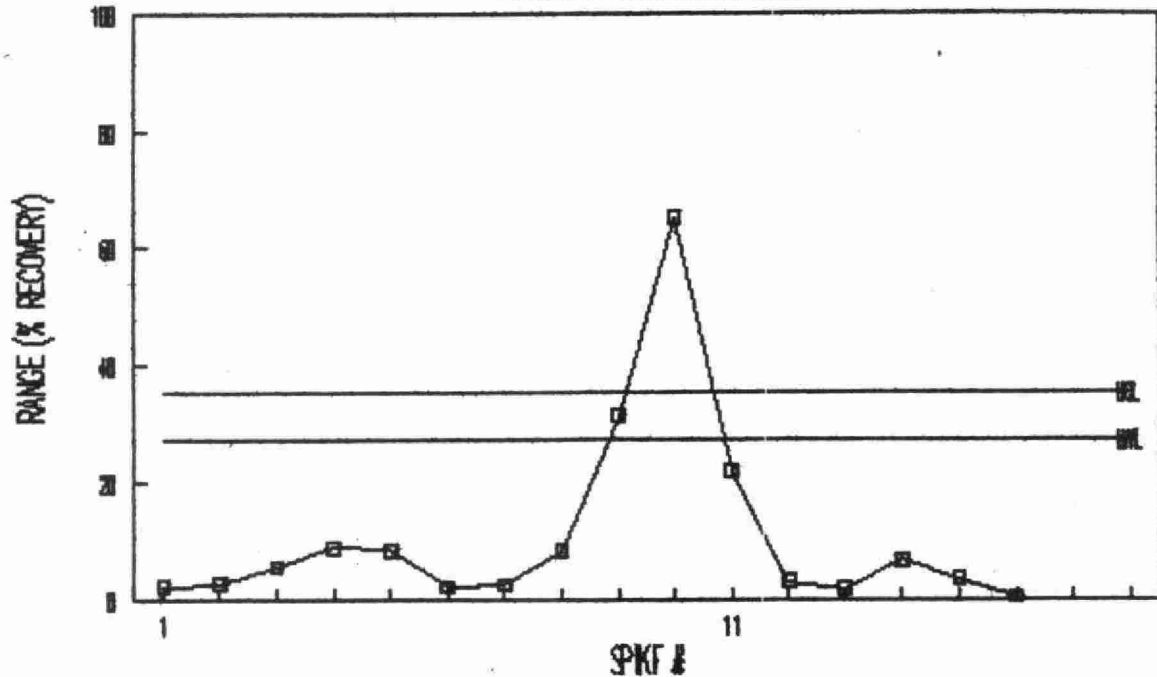
PWRFA: PIMAR(hp)

SUMMARY OF 1992 CONTROL DATA



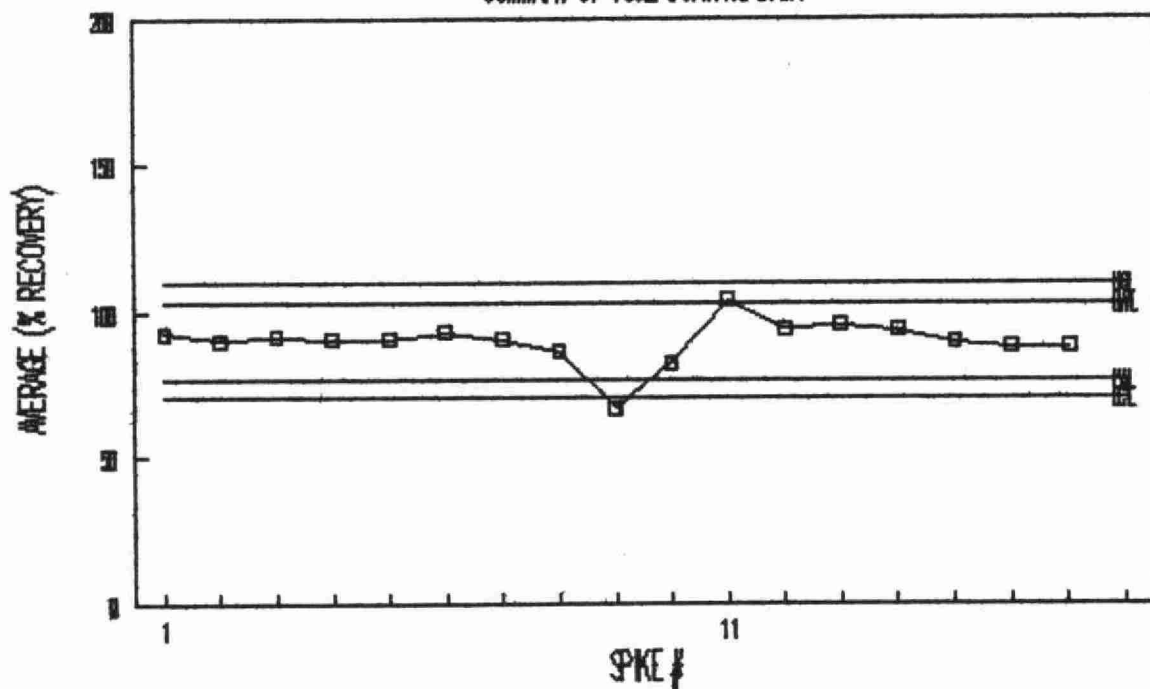
PWRFA: PIMAR(hp)

SUMMARY OF 1992 CONTROL DATA



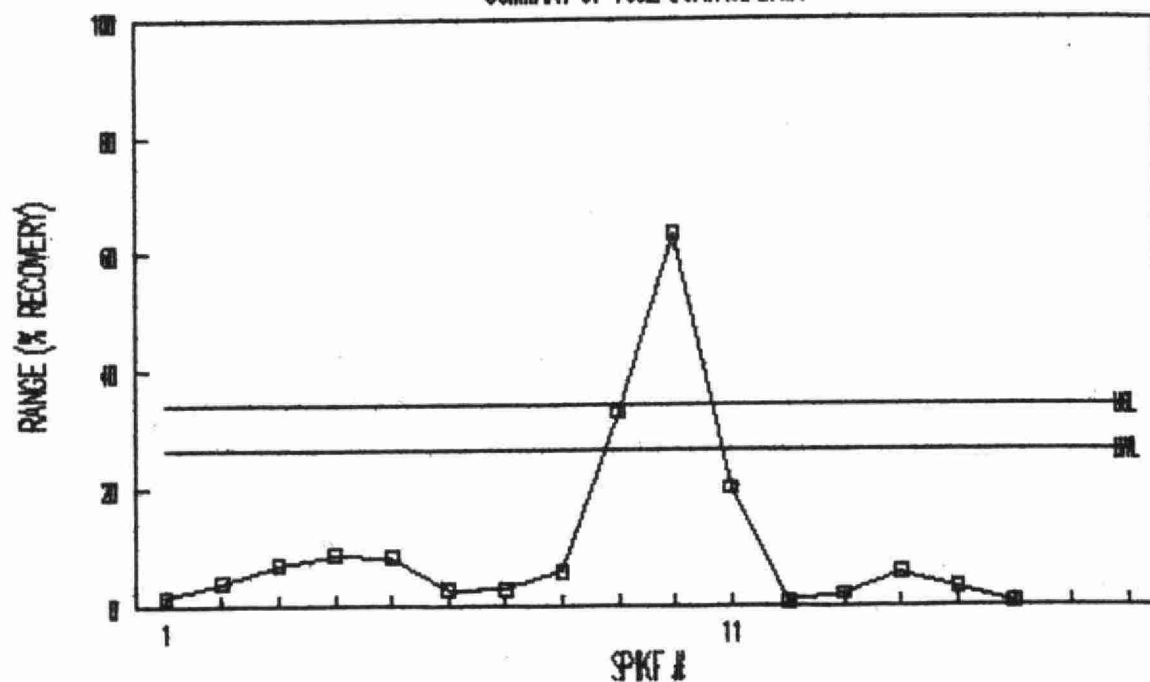
PWRFA: SANPIM(hp)

SUMMARY OF 1992 CONTROL DATA



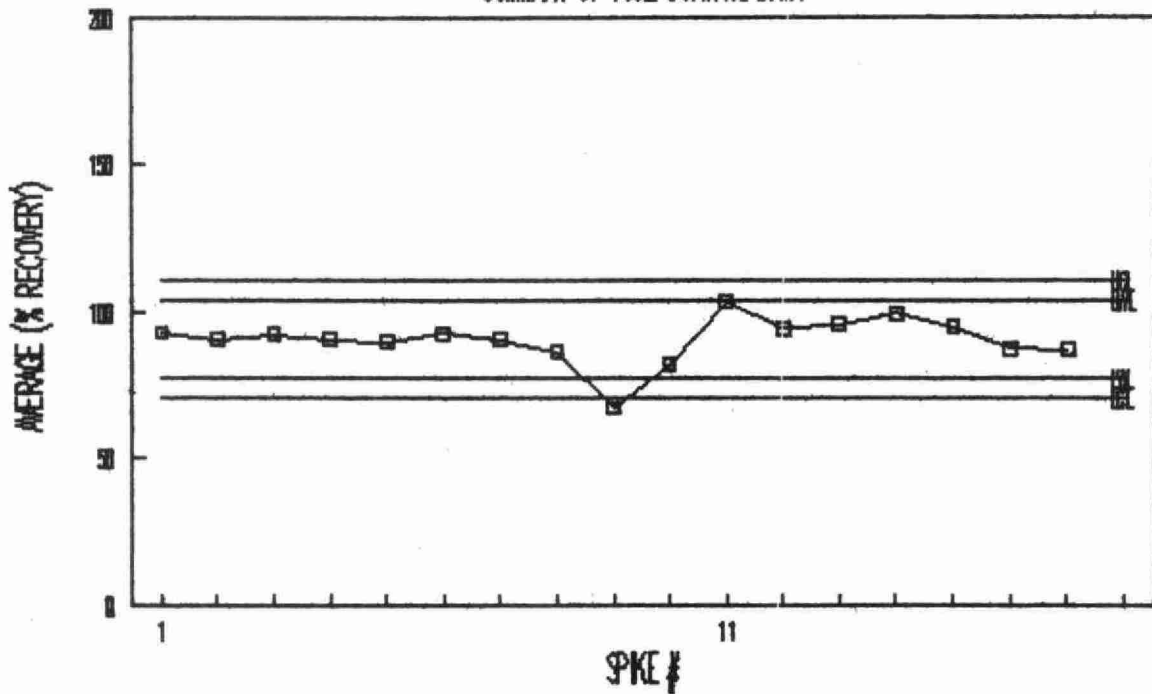
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SUMMARY OF 1992 CONTROL DATA



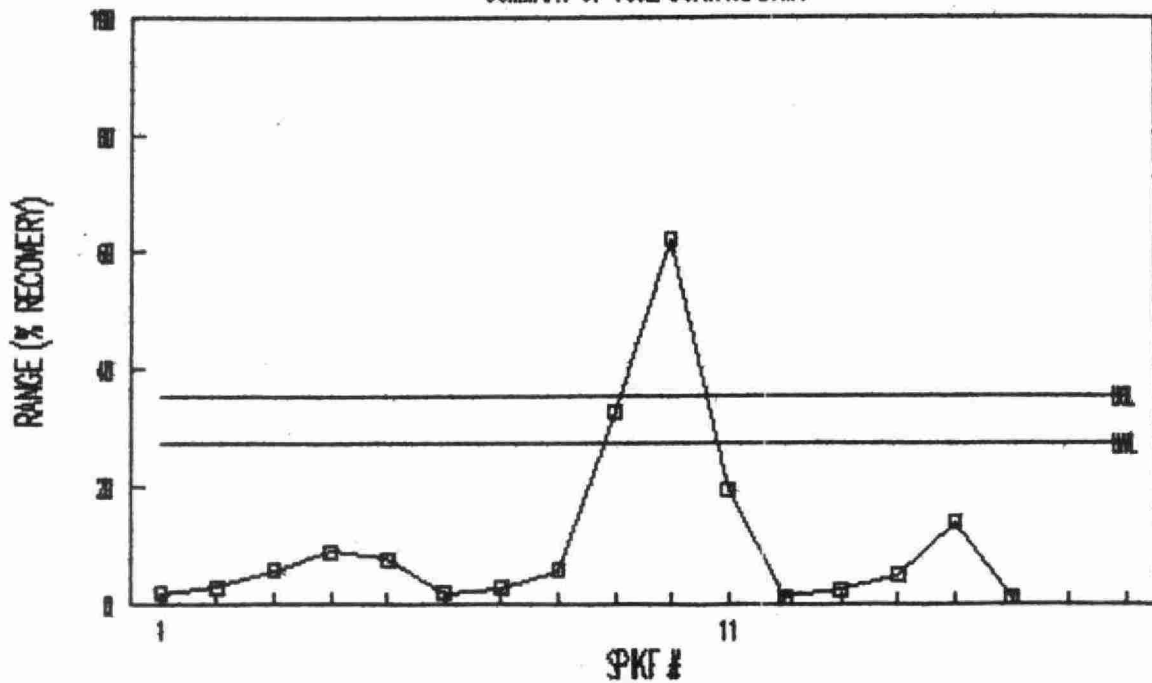
PWRFA: ISOPIM(hp)

SUMMARY OF 1992 CONTROL DATA



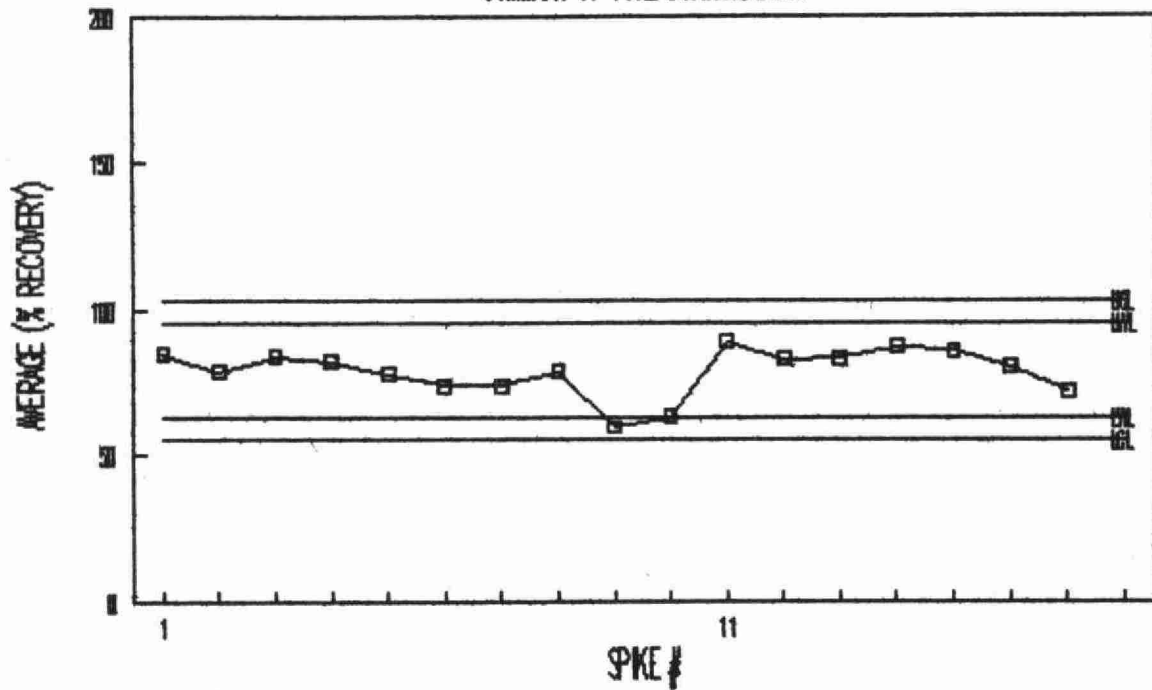
PWRFA: ISOPIM(hp)

SUMMARY OF 1992 CONTROL DATA



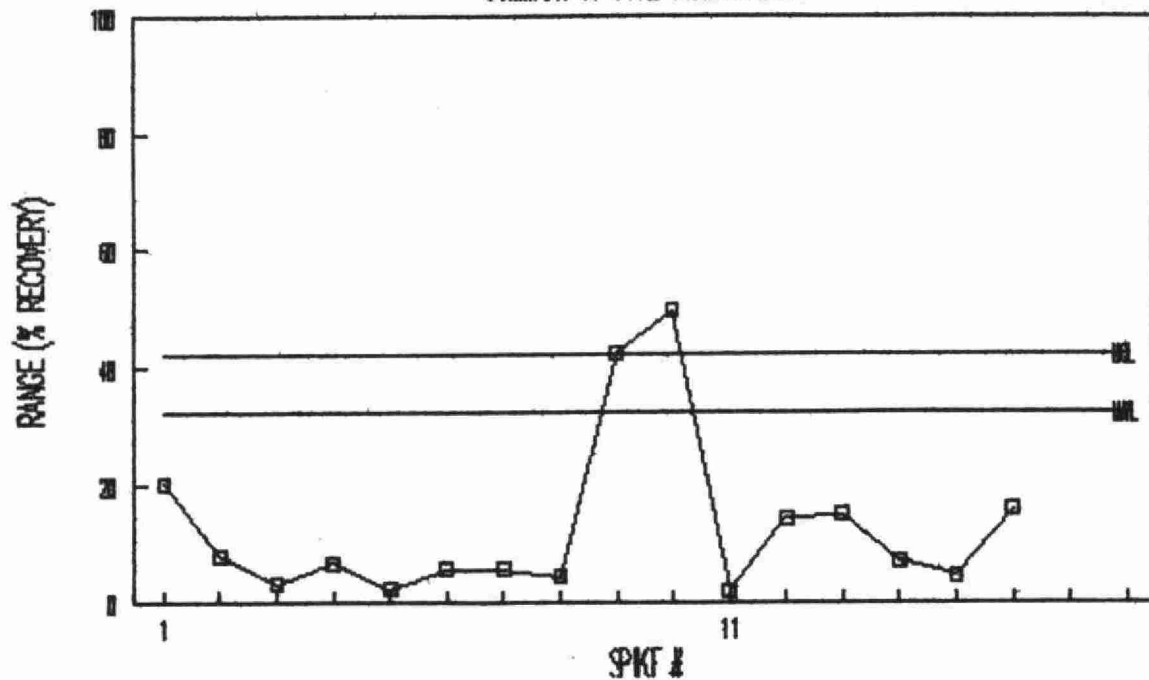
PWRFA: PALUST(hp)

SUMMARY OF 1992 CONTROL DATA



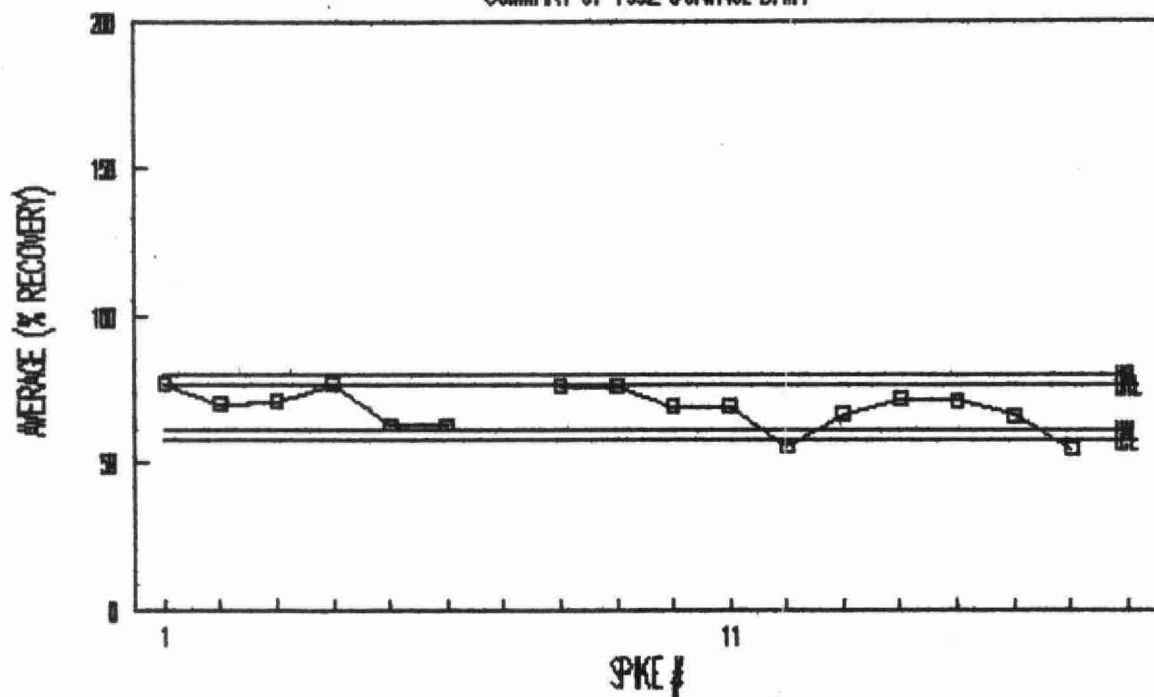
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SUMMARY OF 1992 CONTROL DATA



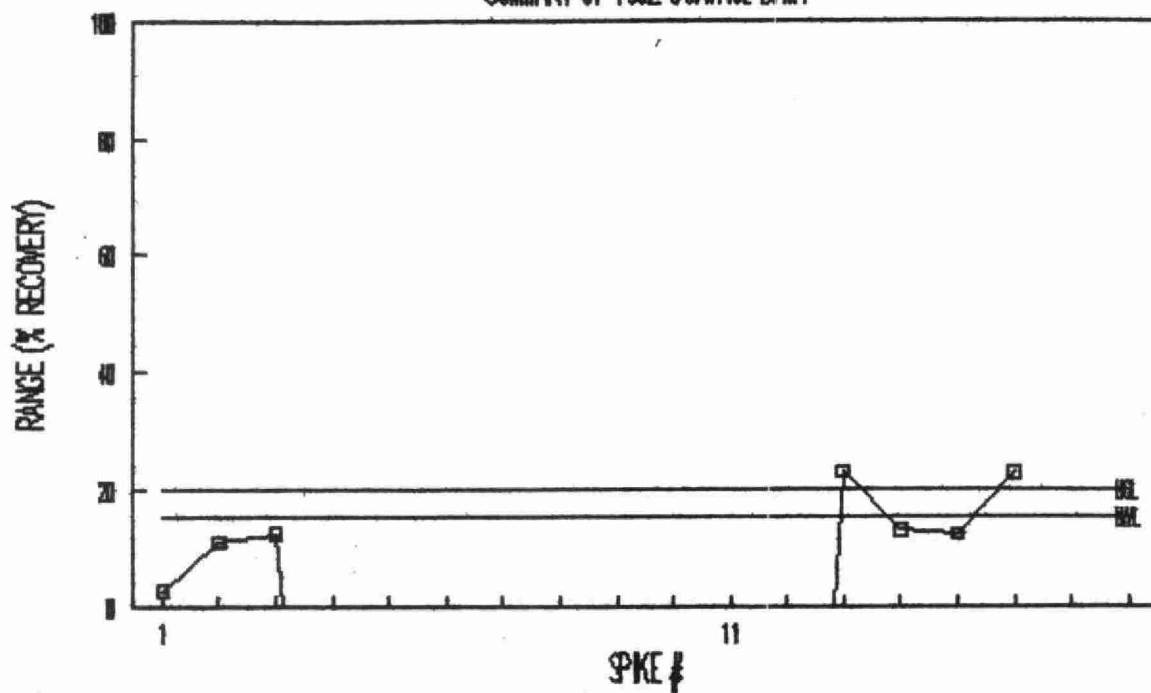
PWRFA: LEVOPI(hp)

SUMMARY OF 1992 CONTROL DATA



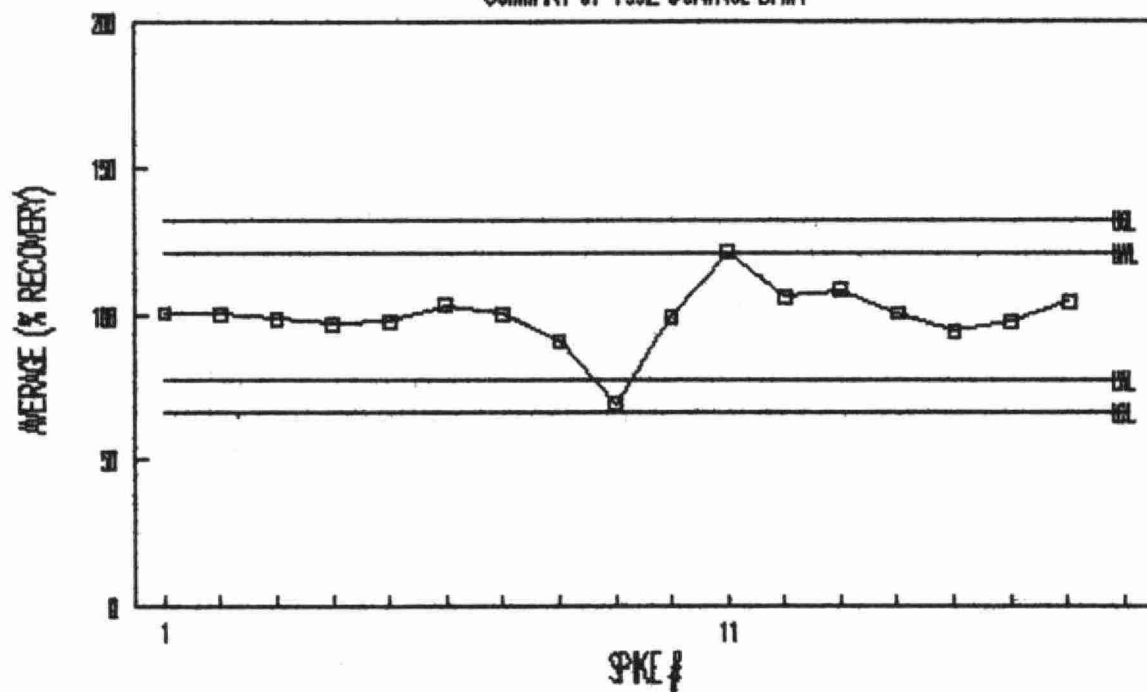
PWRFA: LEVOPI(hp)

SUMMARY OF 1992 CONTROL DATA



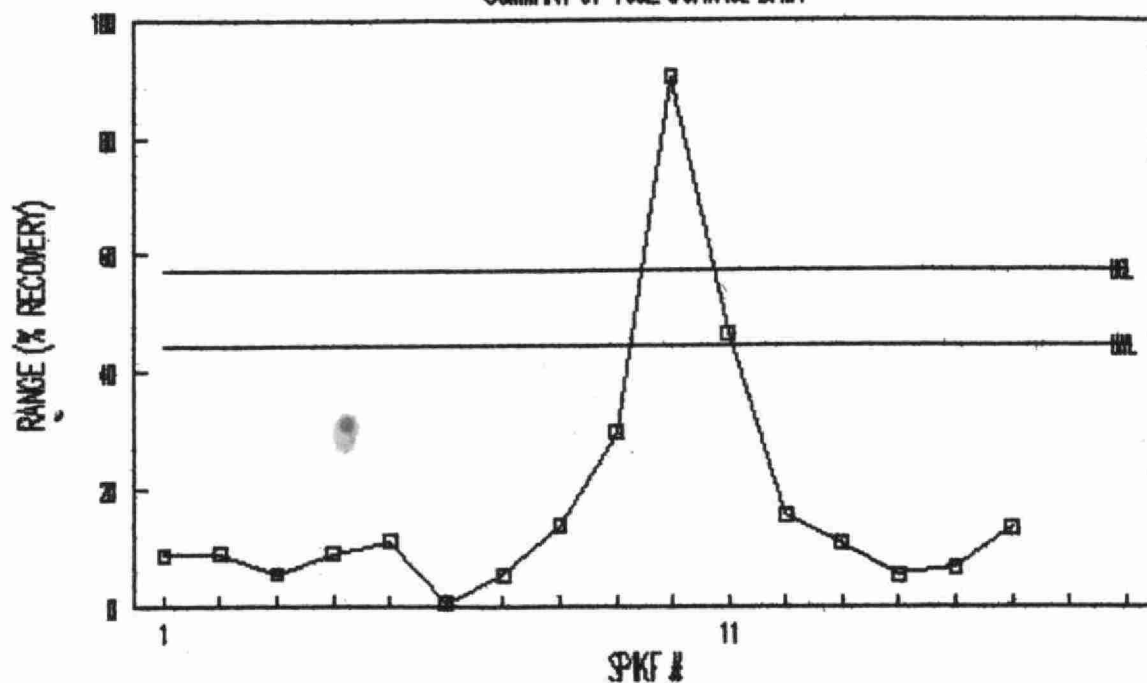
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SUMMARY OF 1992 CONTROL DATA



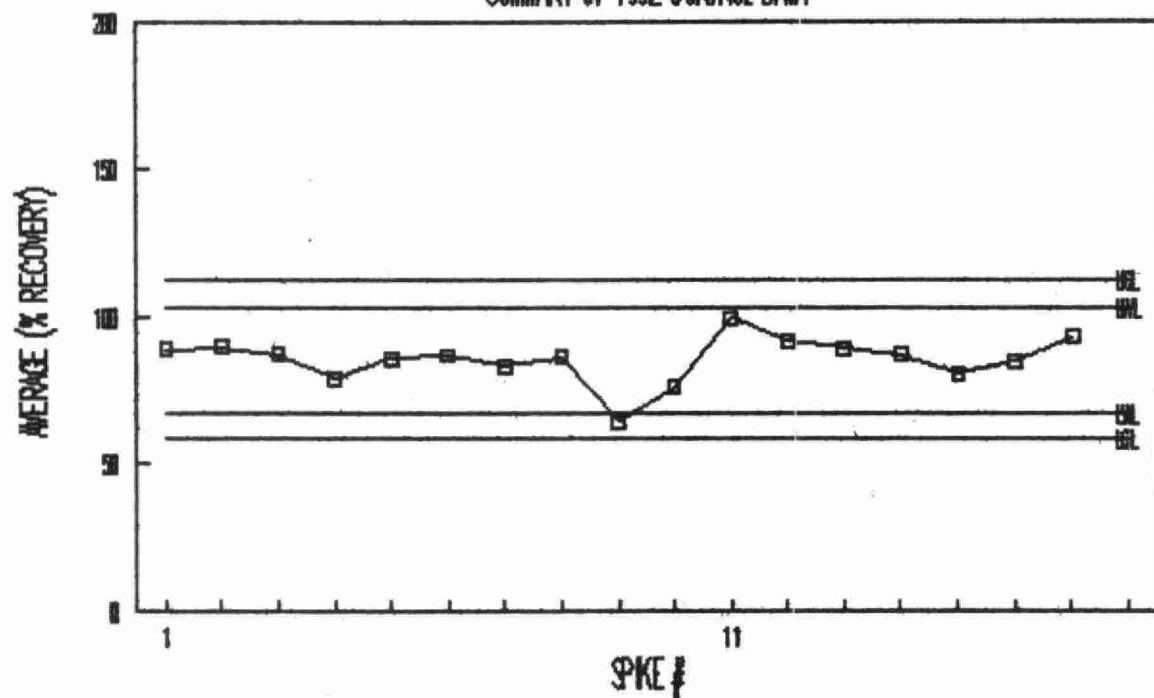
PWRFA: DHAB(hp)

SUMMARY OF 1992 CONTROL DATA



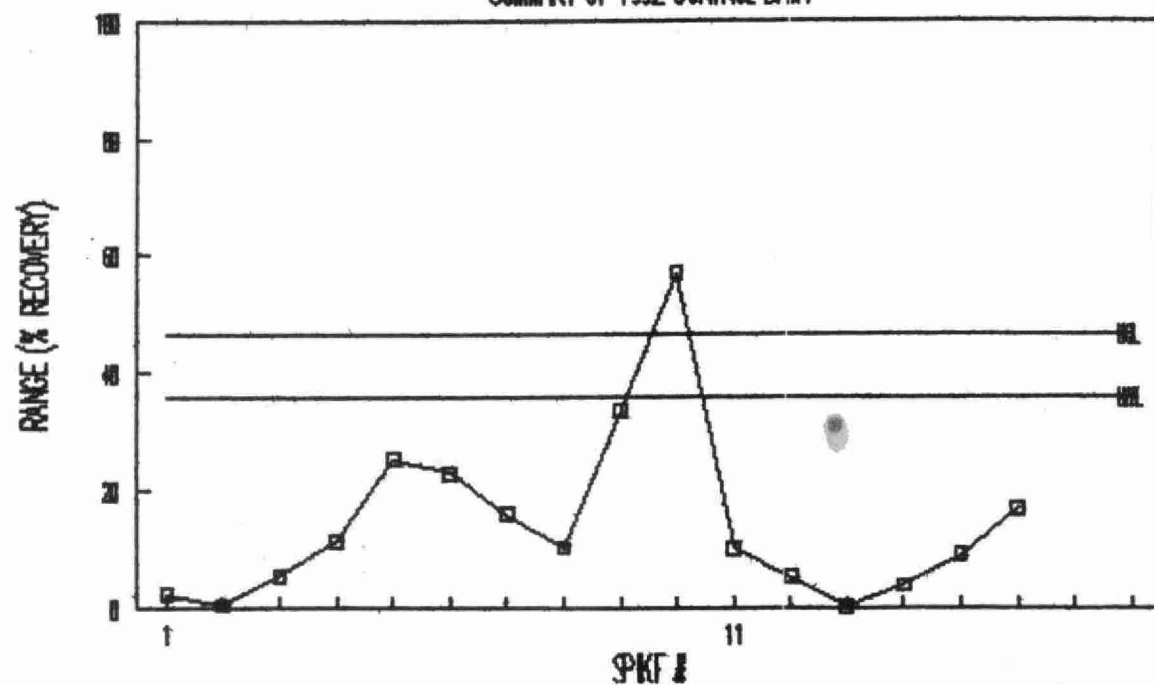
PWRFA: ARACH(hp)

SUMMARY OF 1992 CONTROL DATA



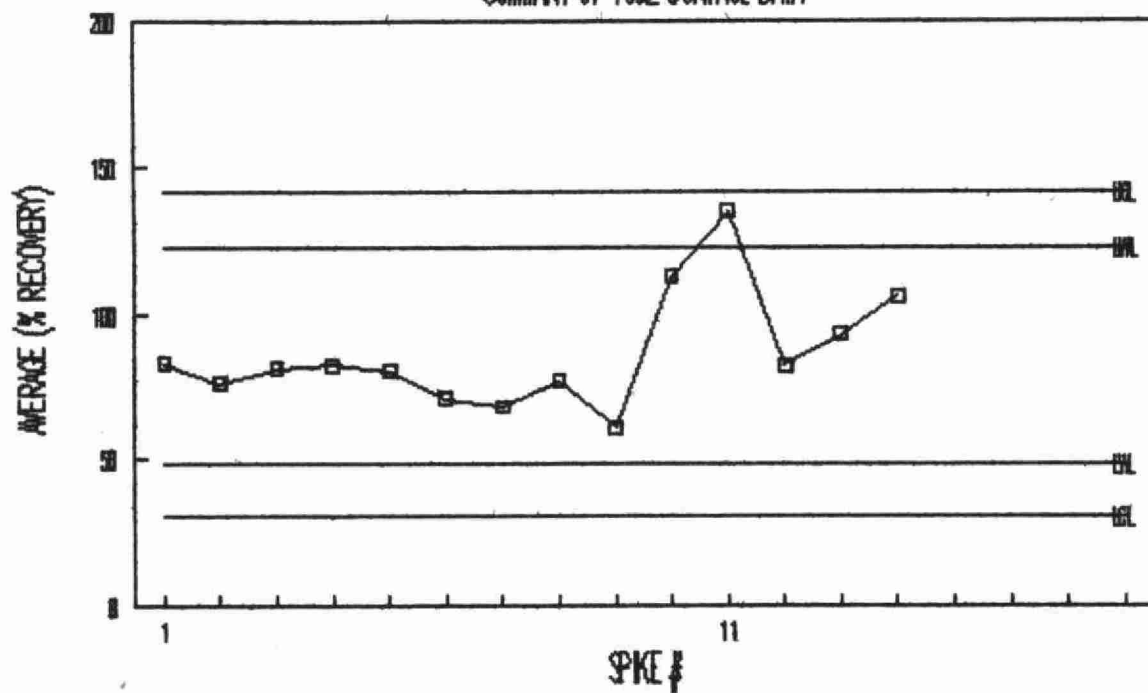
PWRFA: ARACH(hp)

SUMMARY OF 1992 CONTROL DATA



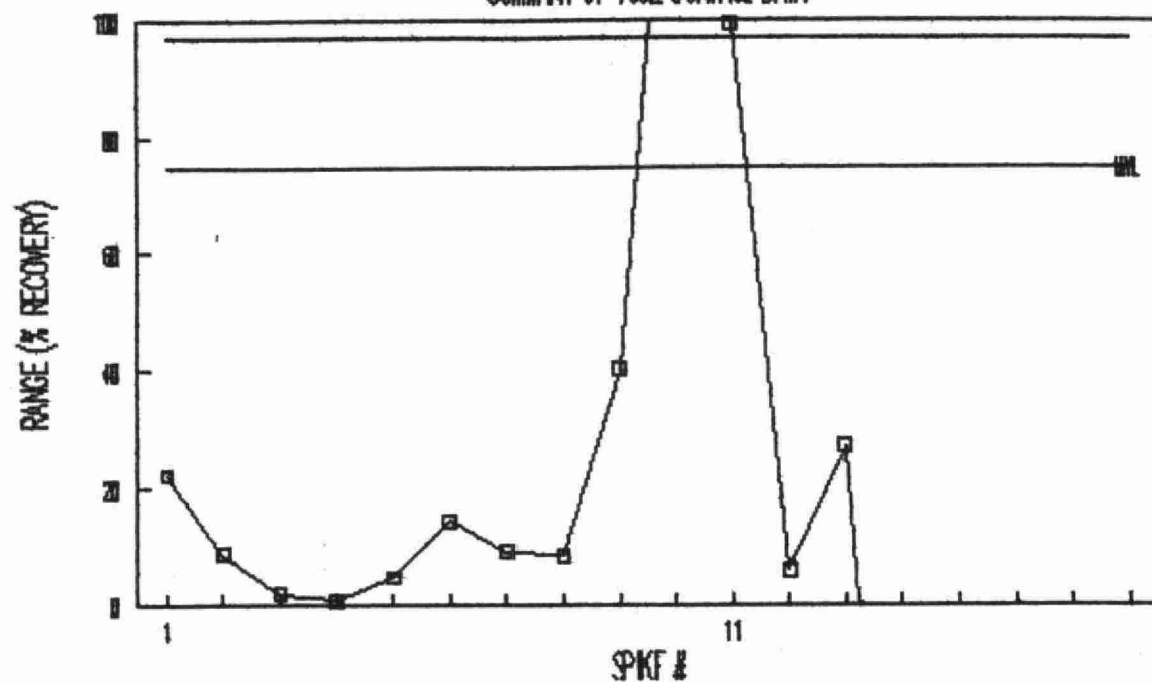
PWRFA: ABIET(hp)

SUMMARY OF 1992 CONTROL DATA



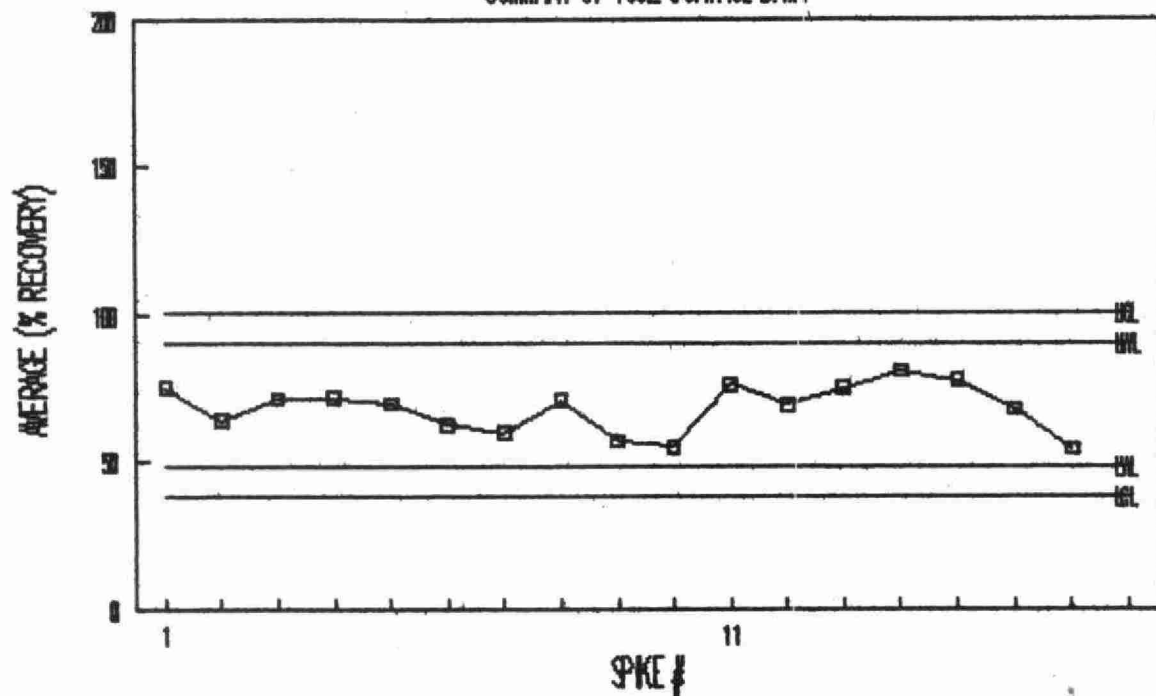
PWRFA: ABIET(hp)

SUMMARY OF 1992 CONTROL DATA



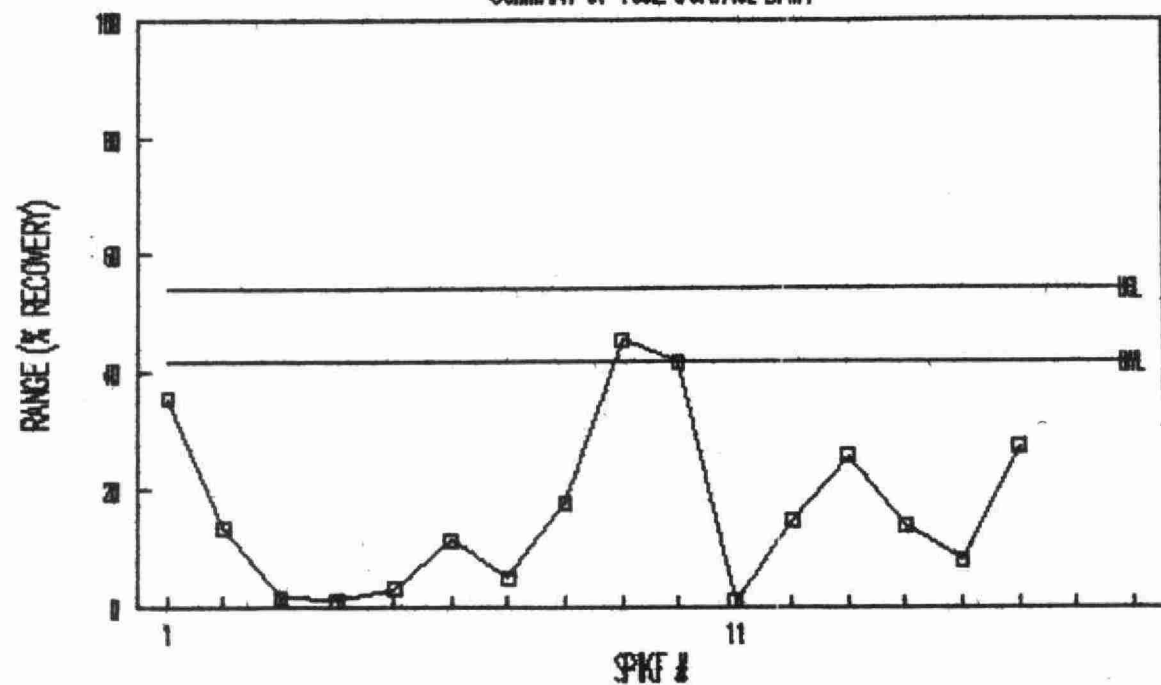
PWRFA: NEOAB(hp)

SUMMARY OF 1992 CONTROL DATA



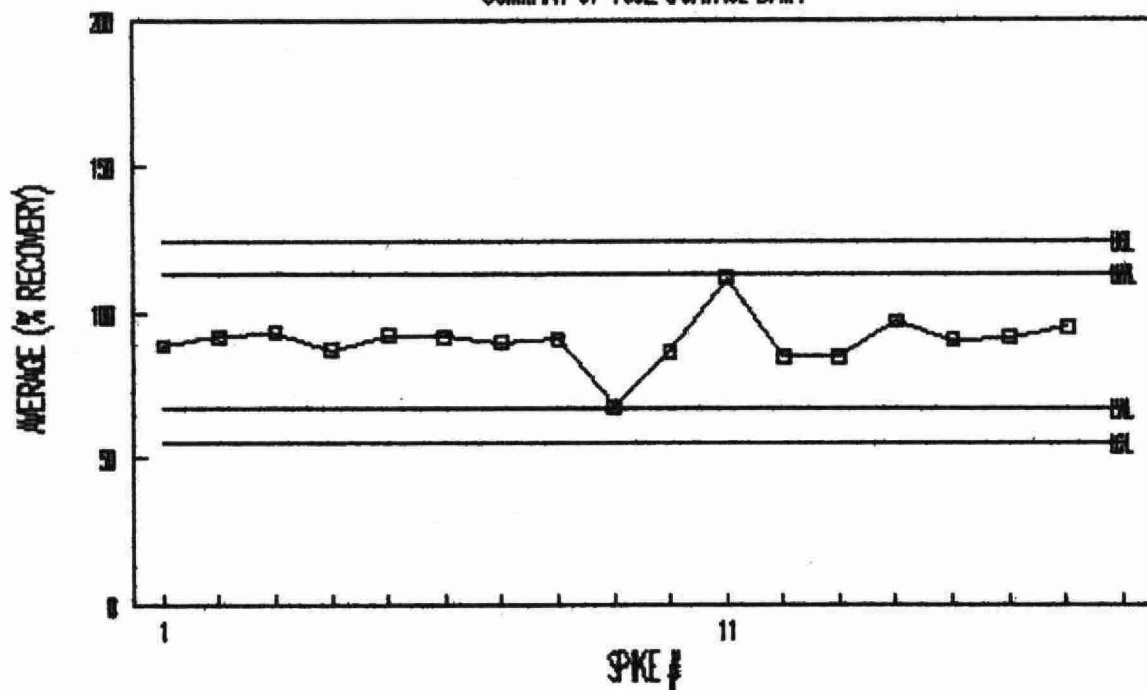
PWRFA: NEOAB(hp)

SUMMARY OF 1992 CONTROL DATA



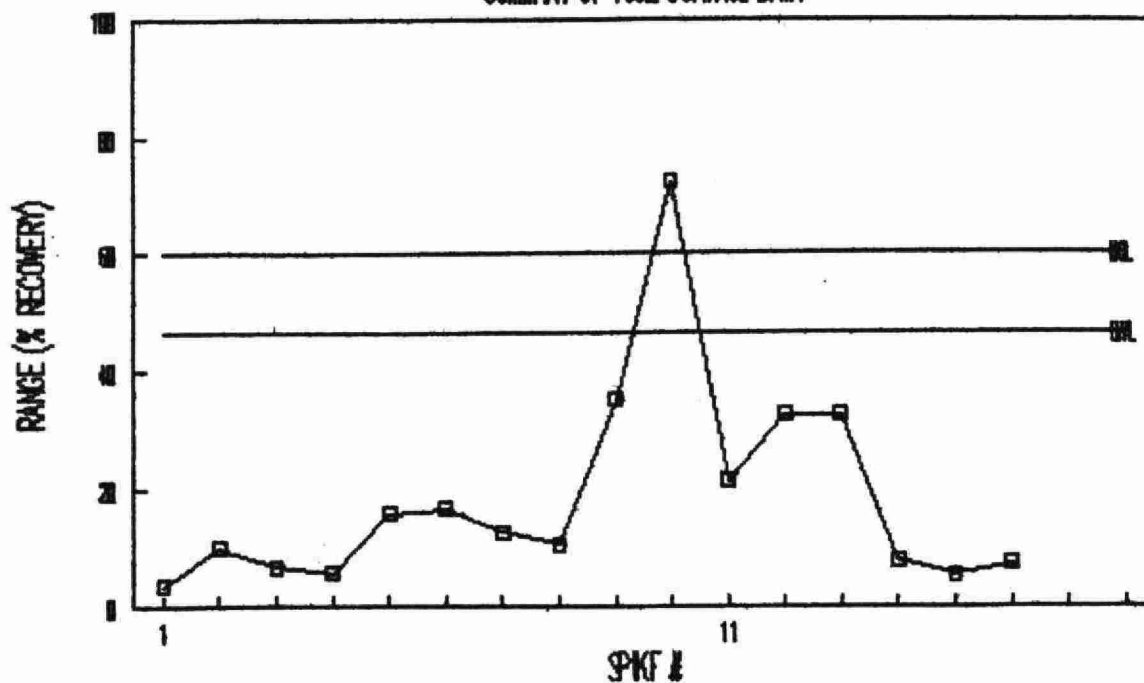
PWRFA: DCLSTE(hp)

SUMMARY OF 1992 CONTROL DATA



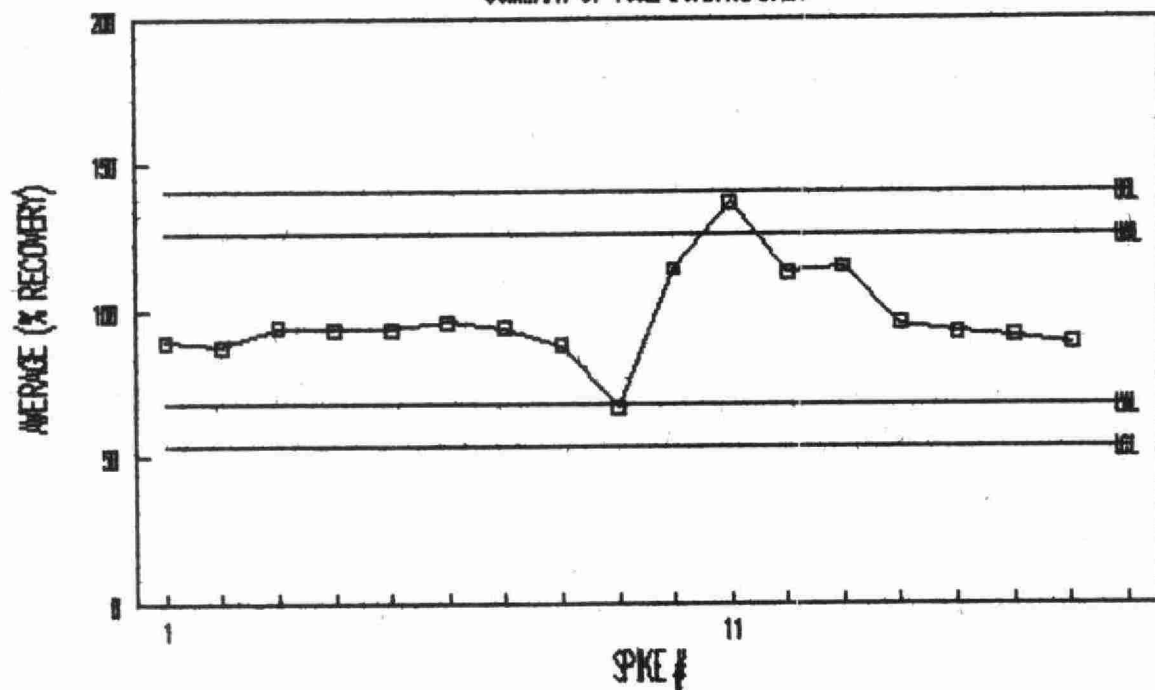
PWRFA: DCLSTE(hp)

SUMMARY OF 1992 CONTROL DATA



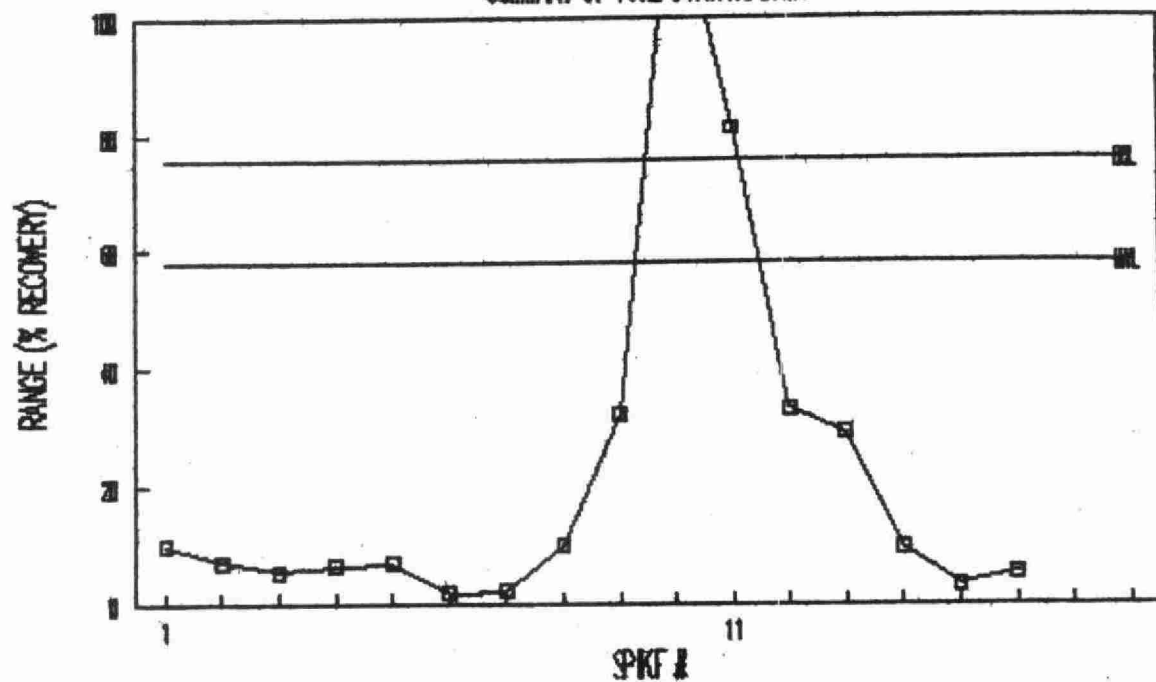
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SUMMARY OF 1992 CONTROL DATA



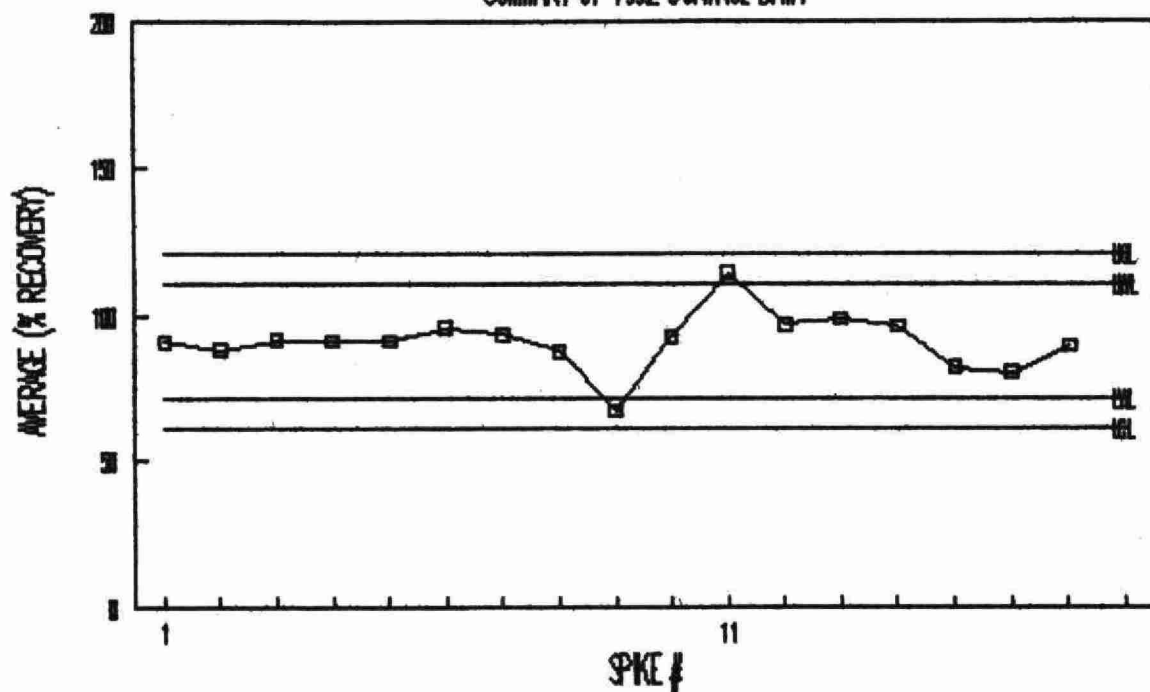
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SUMMARY OF 1992 CONTROL DATA



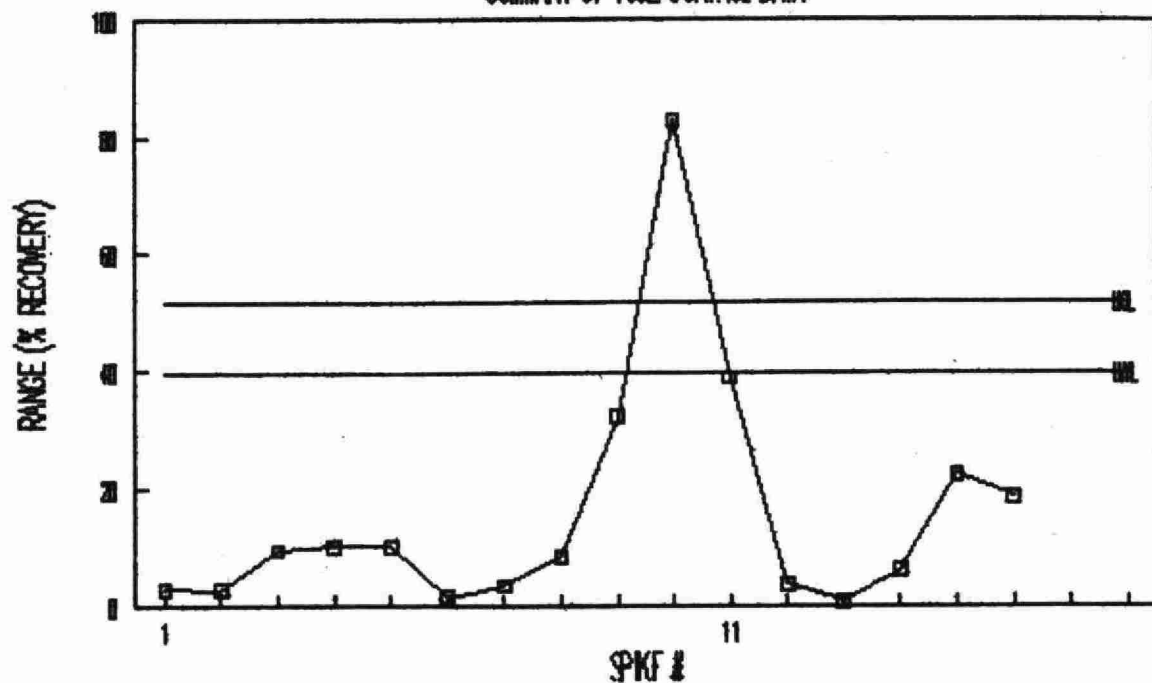
PWRFA: DCDHAB(hp)

SUMMARY OF 1992 CONTROL DATA



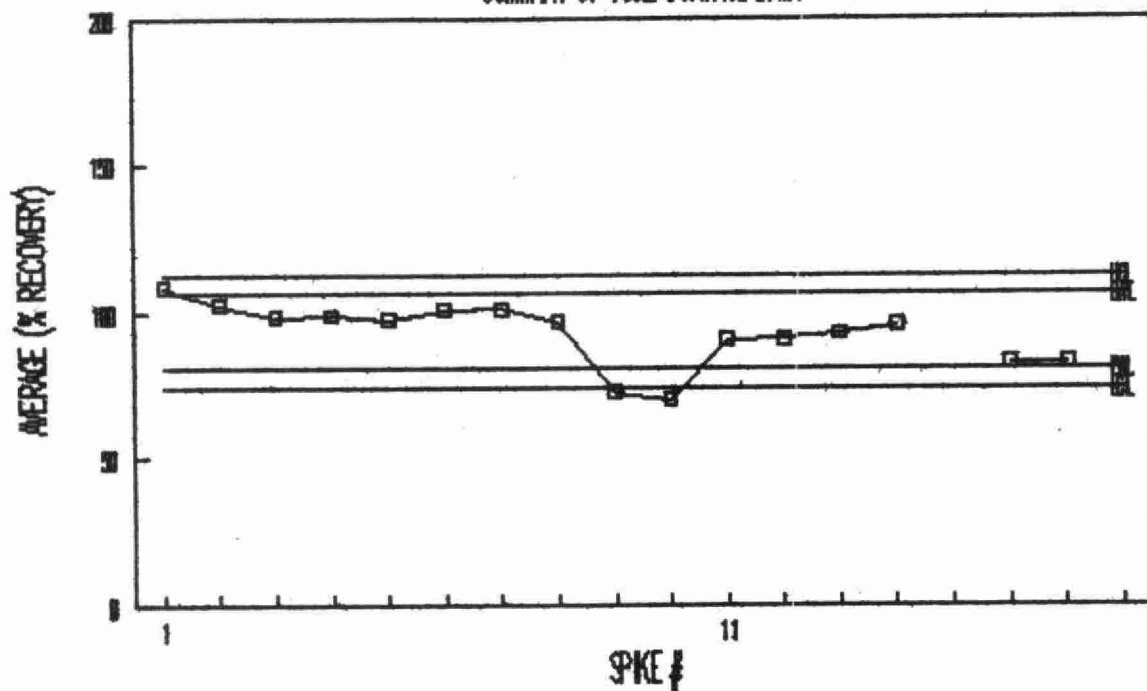
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SUMMARY OF 1992 CONTROL DATA



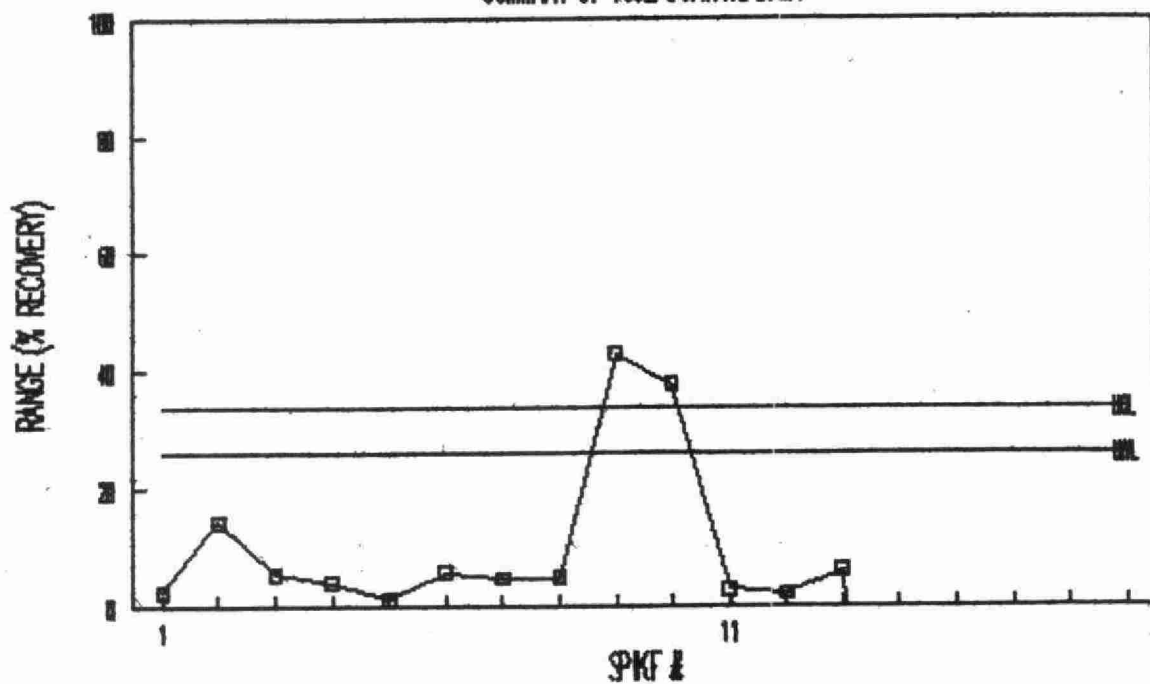
PWRFA: OMP(hp)

SUMMARY OF 1992 CONTROL DATA



PWRFA: OMP(hp)

SUMMARY OF 1992 CONTROL DATA



UNIT: WASTEWATER -E3166A MATRIX: Water
 WORKSTATION: PWRFA - DB INSTRUMENT: GC
 TIME PERIOD: JAM.-DEC. 1992 NO. OBSERVATIONS: 18

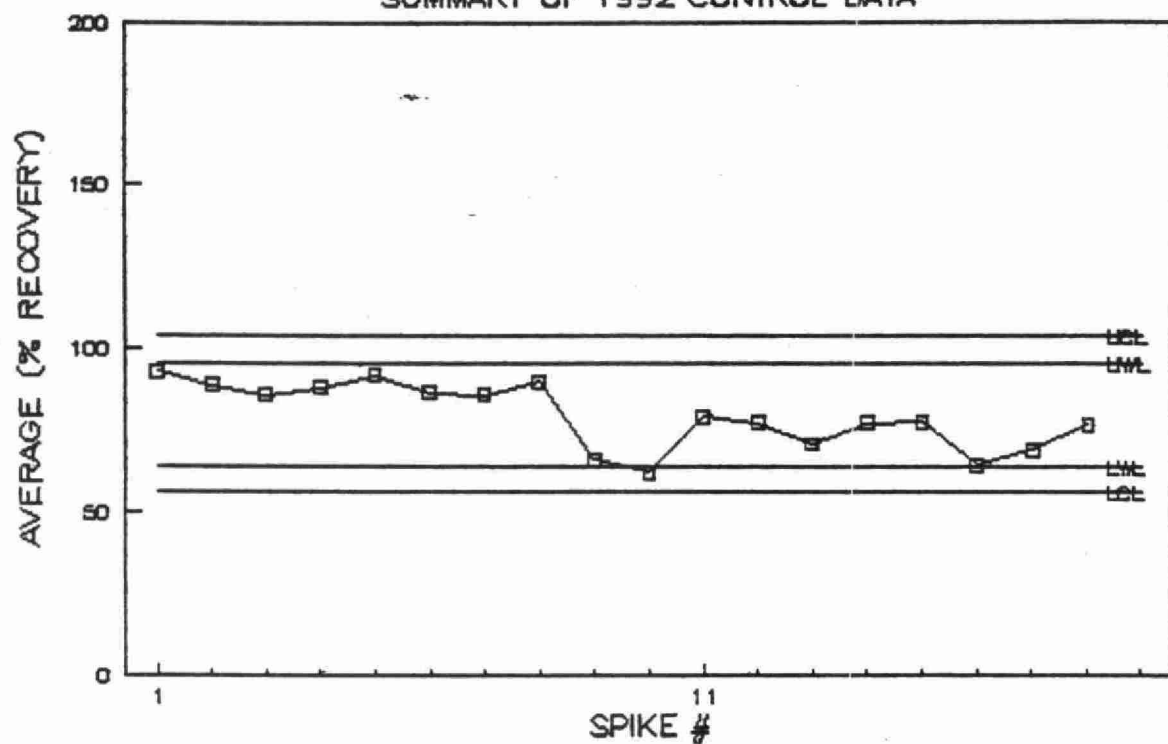
YEARLY CALCULATION

PARAMETER COMPOUND	CONC.	AVG. SPK. % REC.	STD. DEV. % REC.	% C.V.
1. CAPRIC	: 500	: 79.92	: 12.56	: 15.72
2. LAURIC	: 500	: 92.24	: 11.07	: 12.00
3. MYRISTIC	: 500	: 93.94	: 11.74	: 12.49
4. PALMITIC	: 500	: 97.59	: 12.85	: 13.17
5. LINOLEIC	: 500	: 90.63	: 11.70	: 12.91
6. LINOLENIC	: 500	: 89.09	: 12.60	: 14.15
7. OLEIC	: 1000	: 93.02	: 12.26	: 13.18
8. STEARIC	: 1000	: 91.39	: 12.15	: 13.29
9. PIMARIC	: 500	: 91.50	: 11.42	: 12.48
10. SANDIMARIC	: 500	: 91.03	: 11.27	: 12.38
11. ISOPIMARIC	: 500	: 90.85	: 12.34	: 13.58
12. PALUSTR *	: 500	: 76.93	: 11.42	: 14.85
13. LEVOPIM *	: 500	: 76.93	: 11.41	: 14.85
14. DHABIETIC	: 500	: 98.56	: 15.51	: 15.74
15. ARACHIDIC	: 500	: 86.91	: 13.47	: 15.50
16. ABIETIC	: 500	: 87.70	: 27.56	: 31.43
17. NEOABIETIC	: 500	: 68.46	: 13.62	: 19.90
18. DICLSTEARIC	: 500	: 96.00	: 15.31	: 15.95
19. CLDHABIETIC	: 500	: 92.66	: 24.65	: 26.60
20. DICLDHABIETIC	: 500	: 96.15	: 24.03	: 24.99
21. % OMP	: 500	: 88.84	: 14.79	: 16.65

* CO-ELUTE

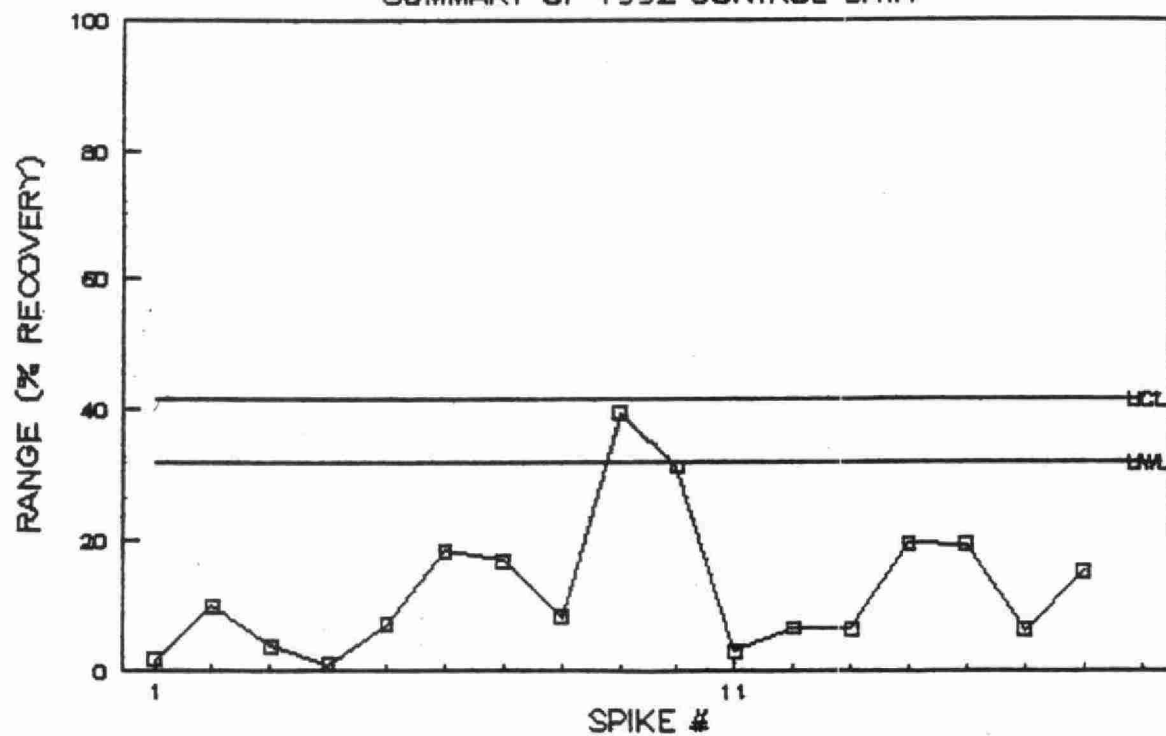
PWRFA (db) : CAPRIC

SUMMARY OF 1992 CONTROL DATA



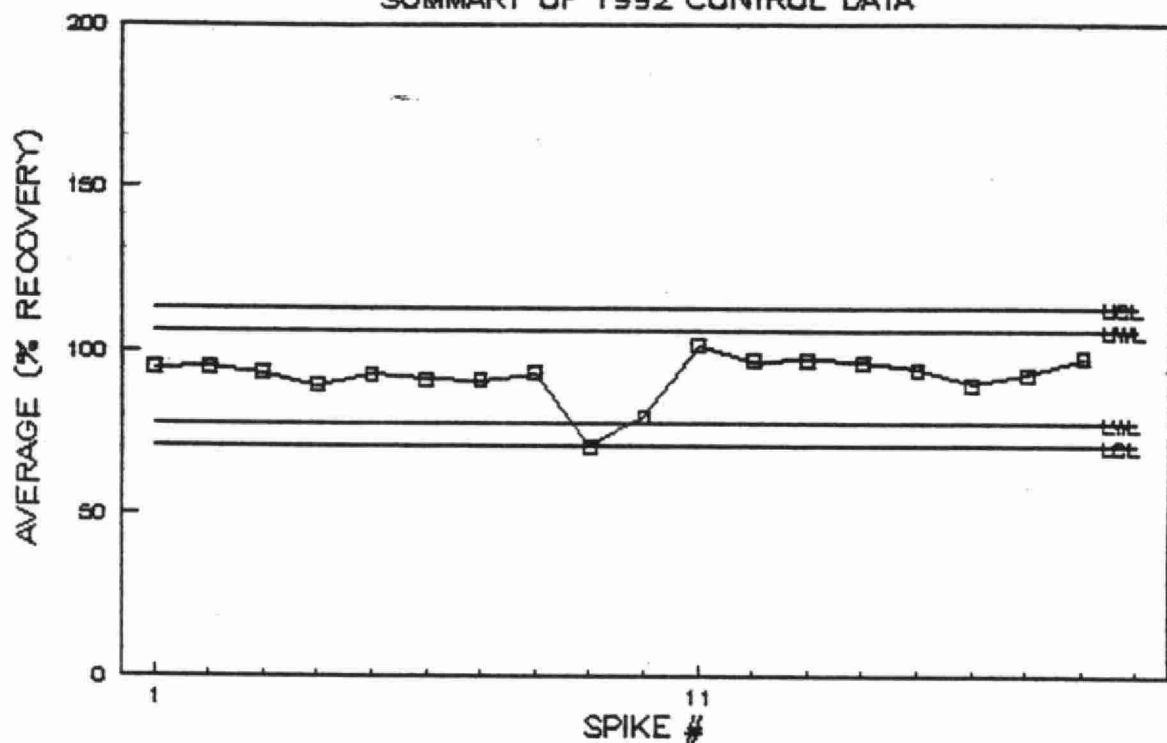
PWRFA (db) : CAPRIC

SUMMARY OF 1992 CONTROL DATA



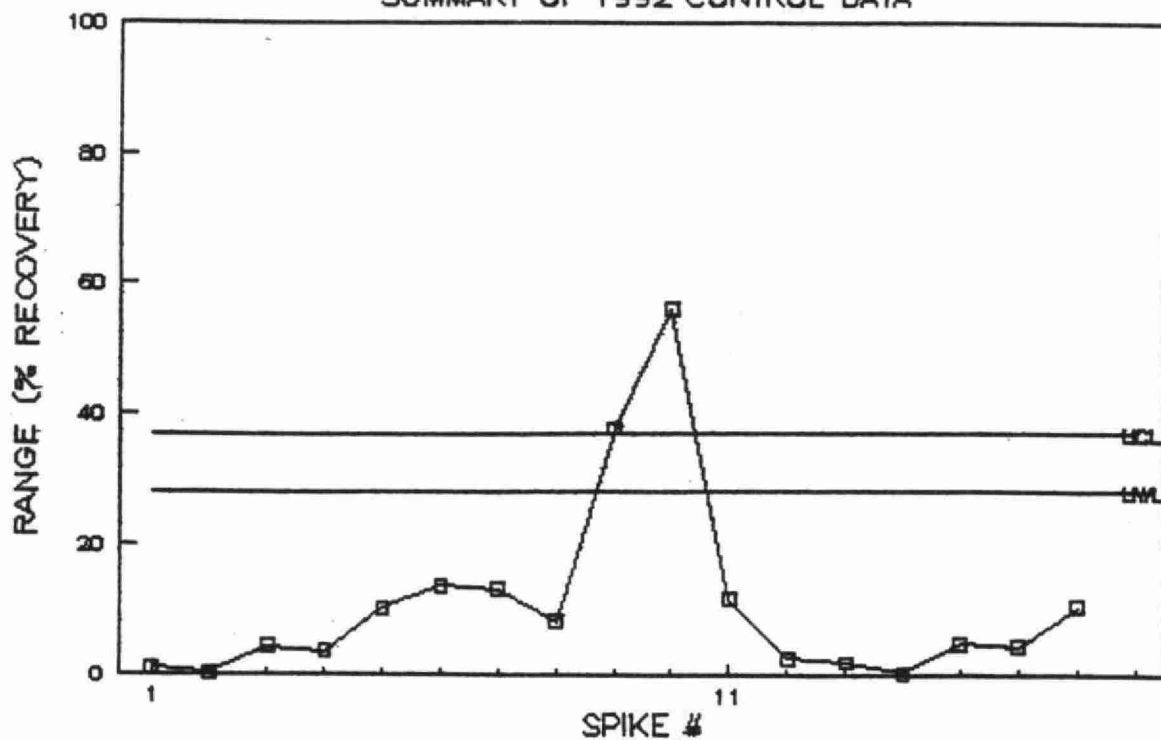
PWRFA (db) : LAURIC

SUMMARY OF 1992 CONTROL DATA



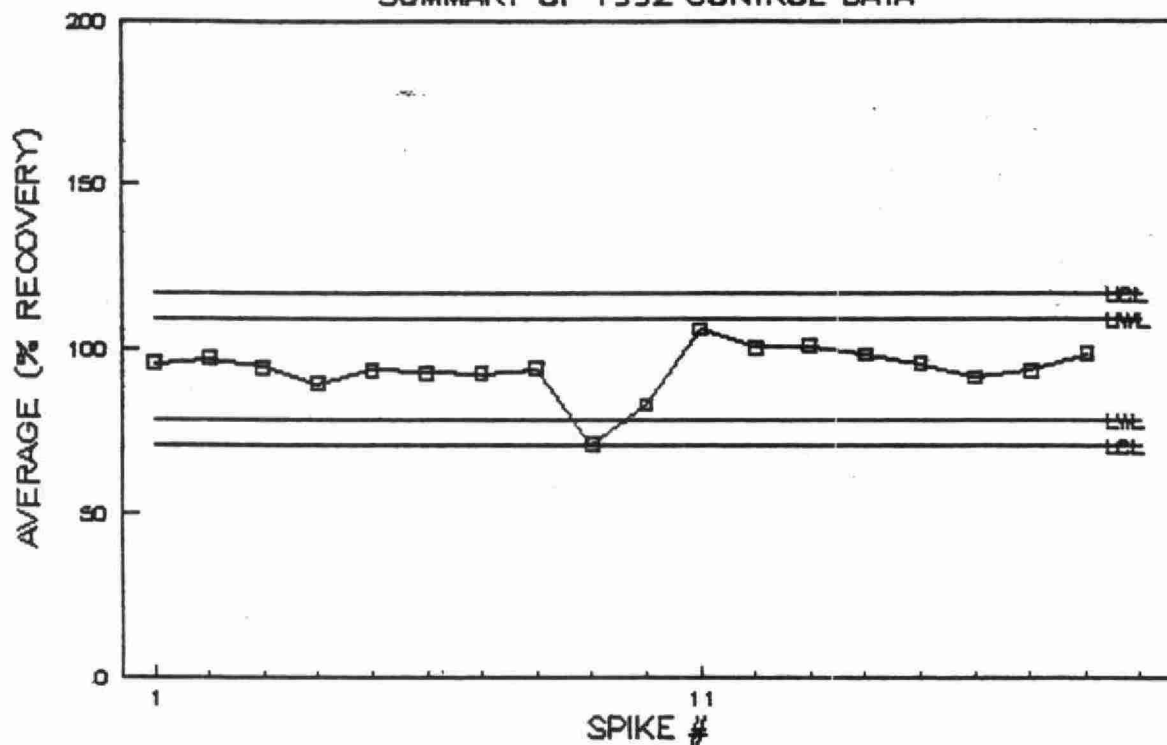
PWRFA (db) : LAURIC

SUMMARY OF 1992 CONTROL DATA



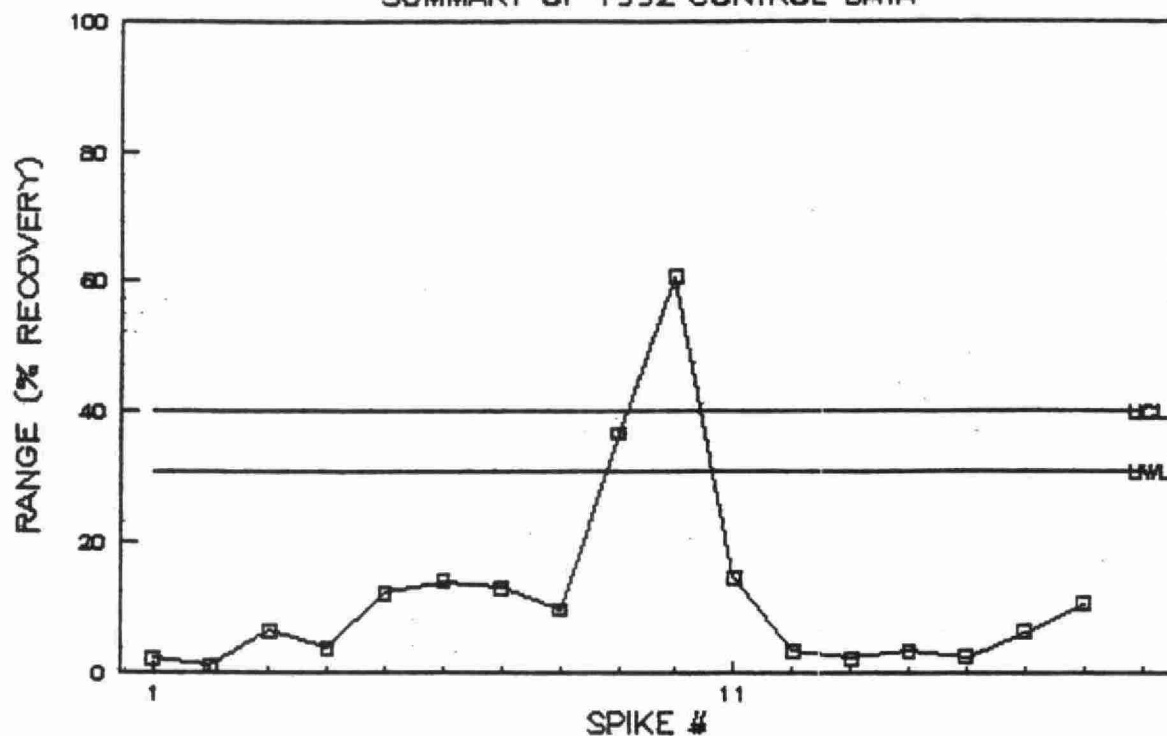
PWRFA (db) : MYRIST

SUMMARY OF 1992 CONTROL DATA



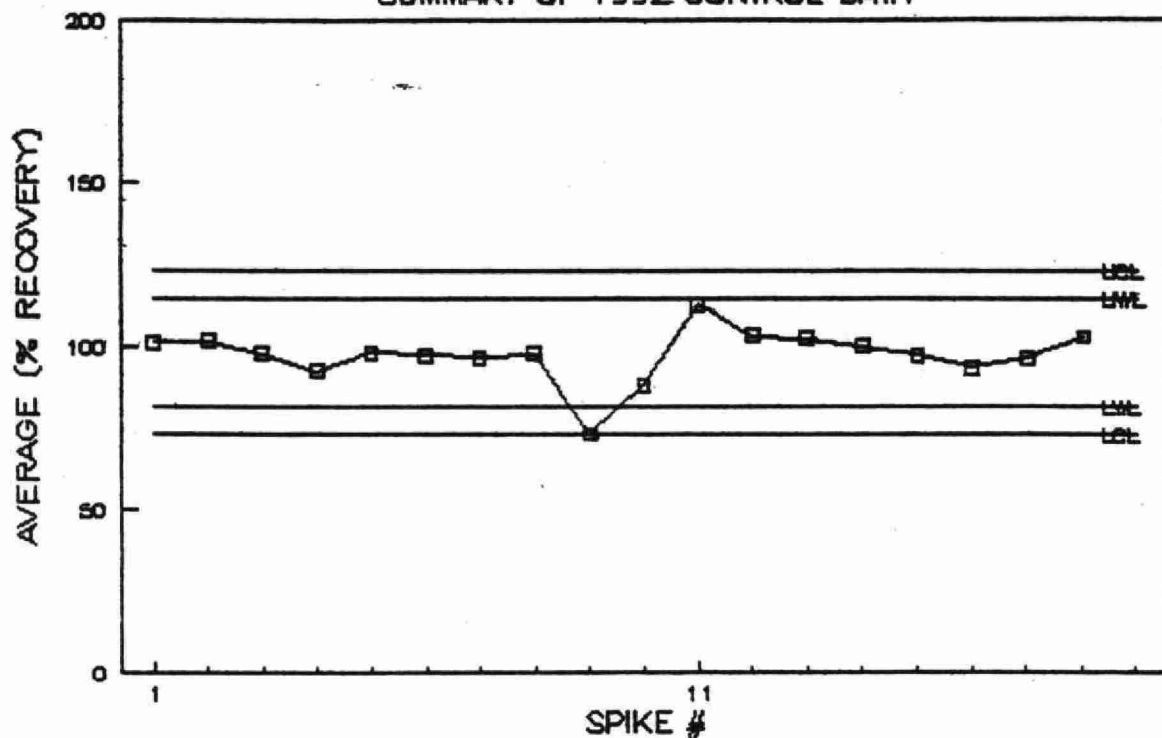
PWRFA (db) : MYRIST

SUMMARY OF 1992 CONTROL DATA



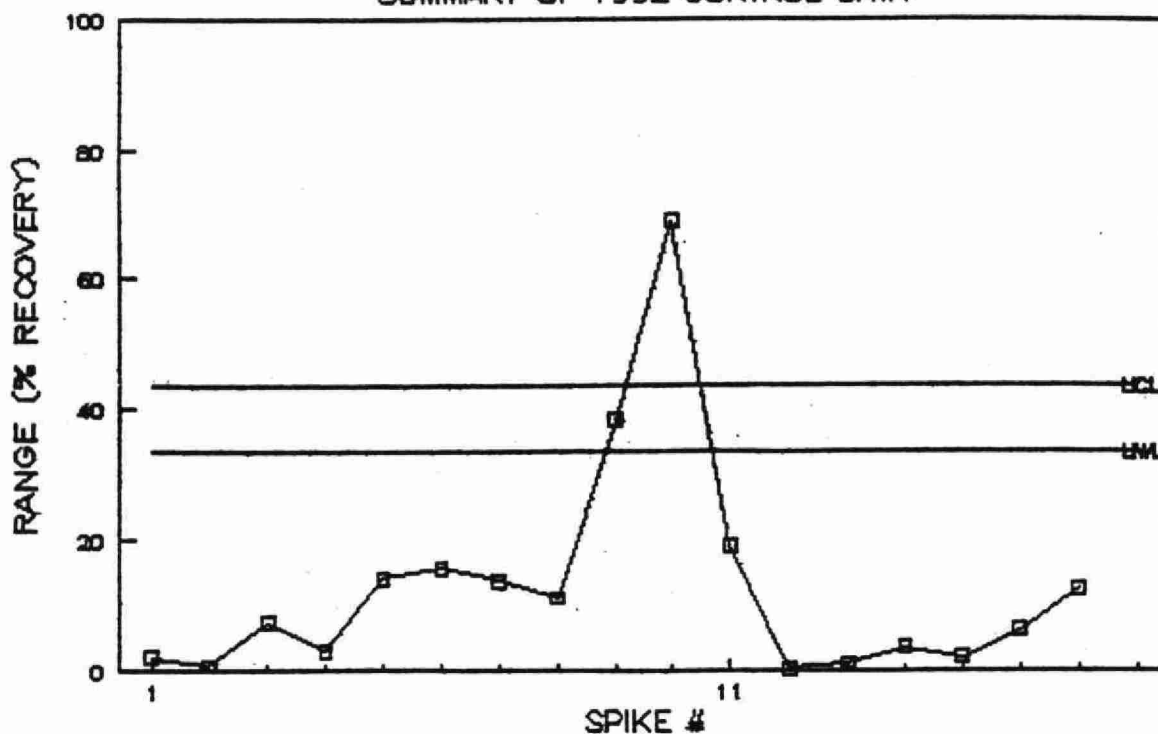
PWRFA (db) : PALMIT

SUMMARY OF 1992 CONTROL DATA



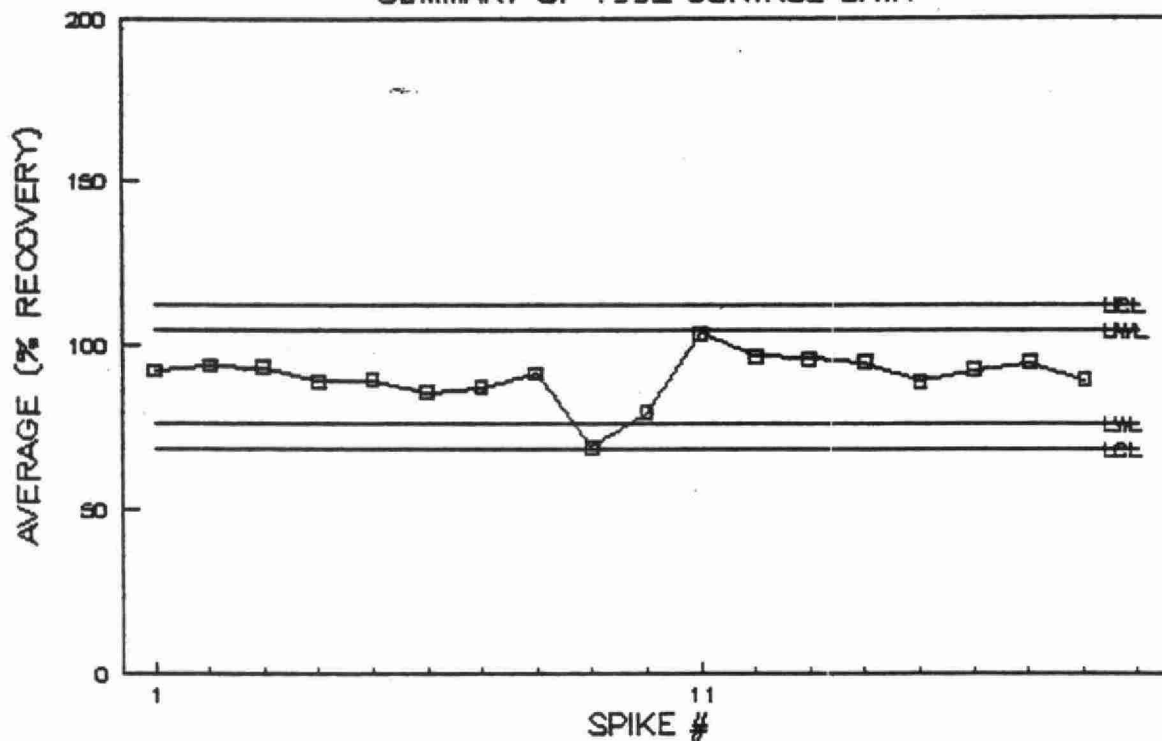
PWRFA (db) : PALMIT

SUMMARY OF 1992 CONTROL DATA



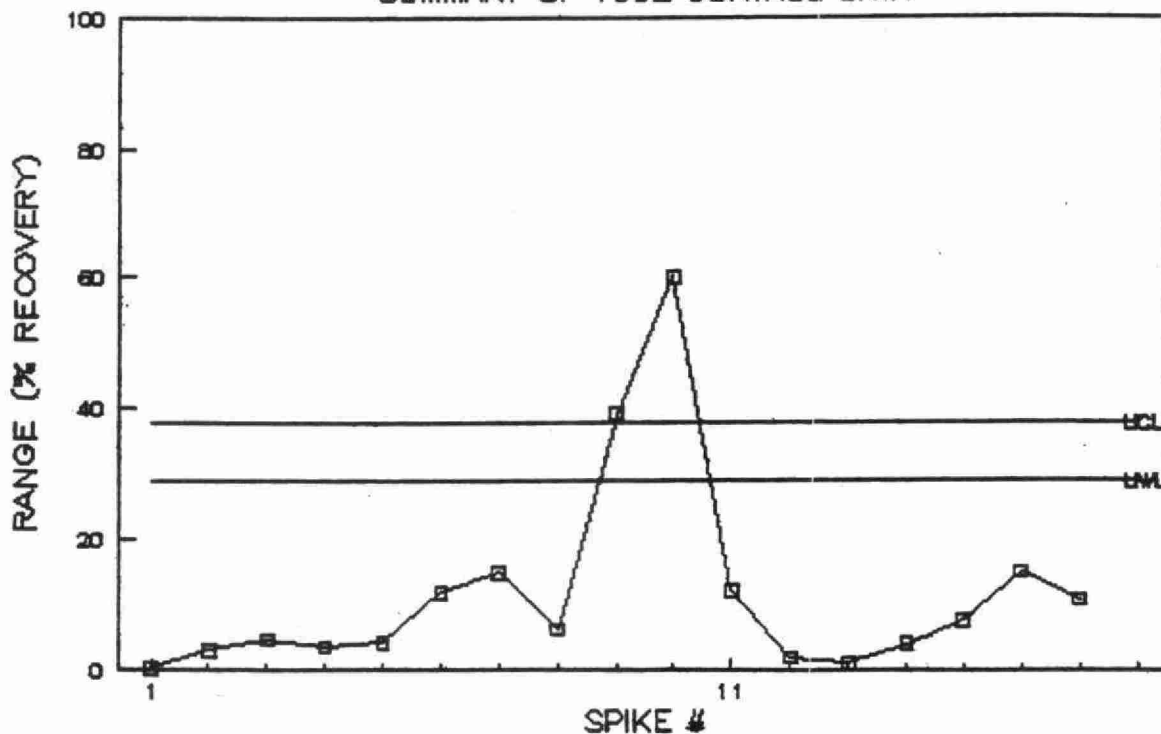
PWRFA (db) : LINOLE

SUMMARY OF 1992 CONTROL DATA



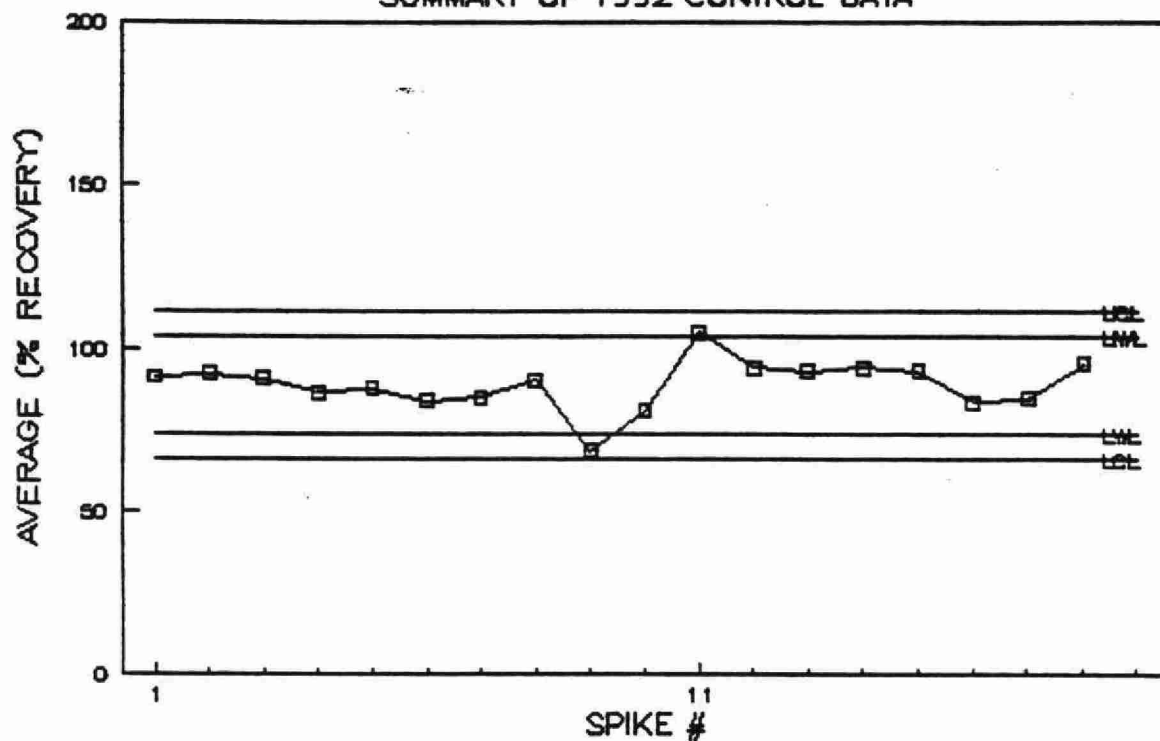
PWRFA (db) : LINOLE

SUMMARY OF 1992 CONTROL DATA



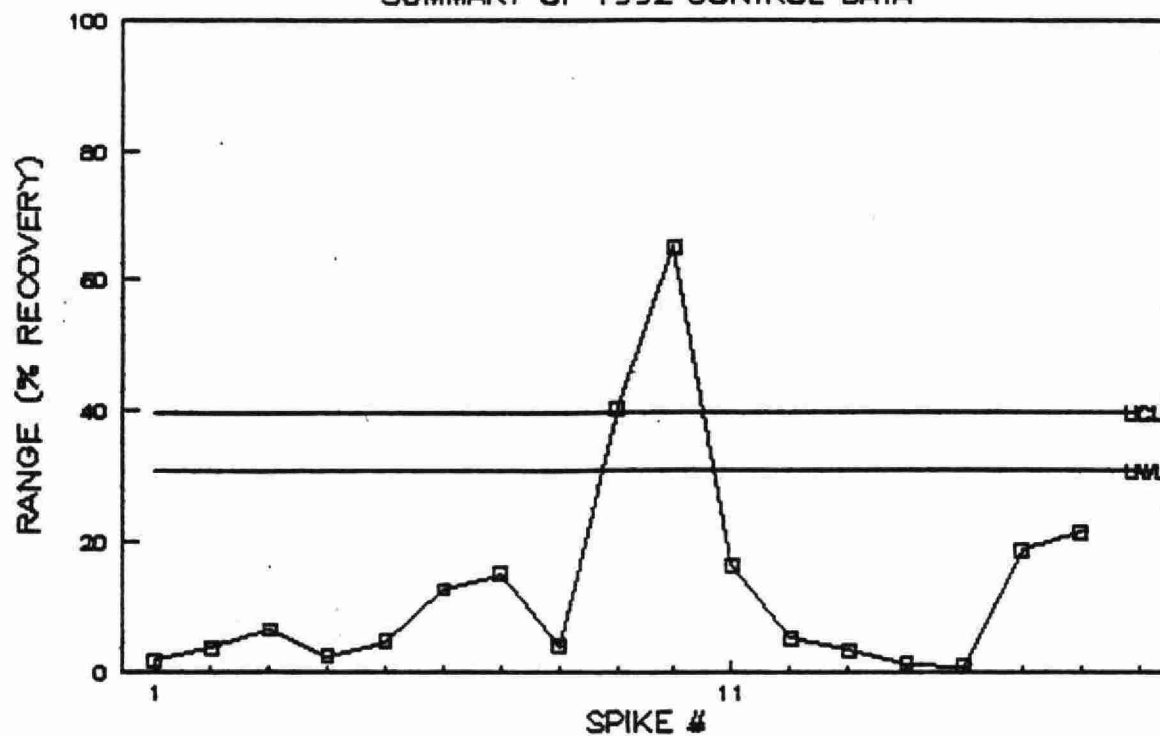
PWRFA (db) : LINOLN

SUMMARY OF 1992 CONTROL DATA



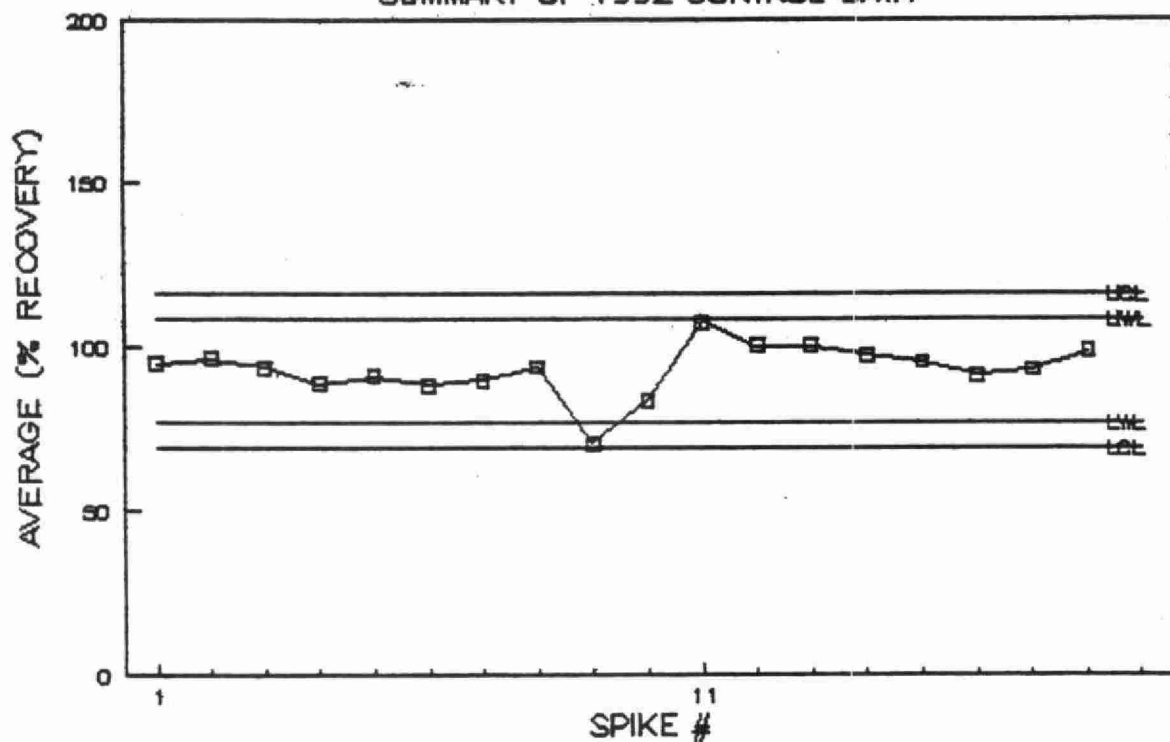
PWRFA (db) : LINOLN

SUMMARY OF 1992 CONTROL DATA



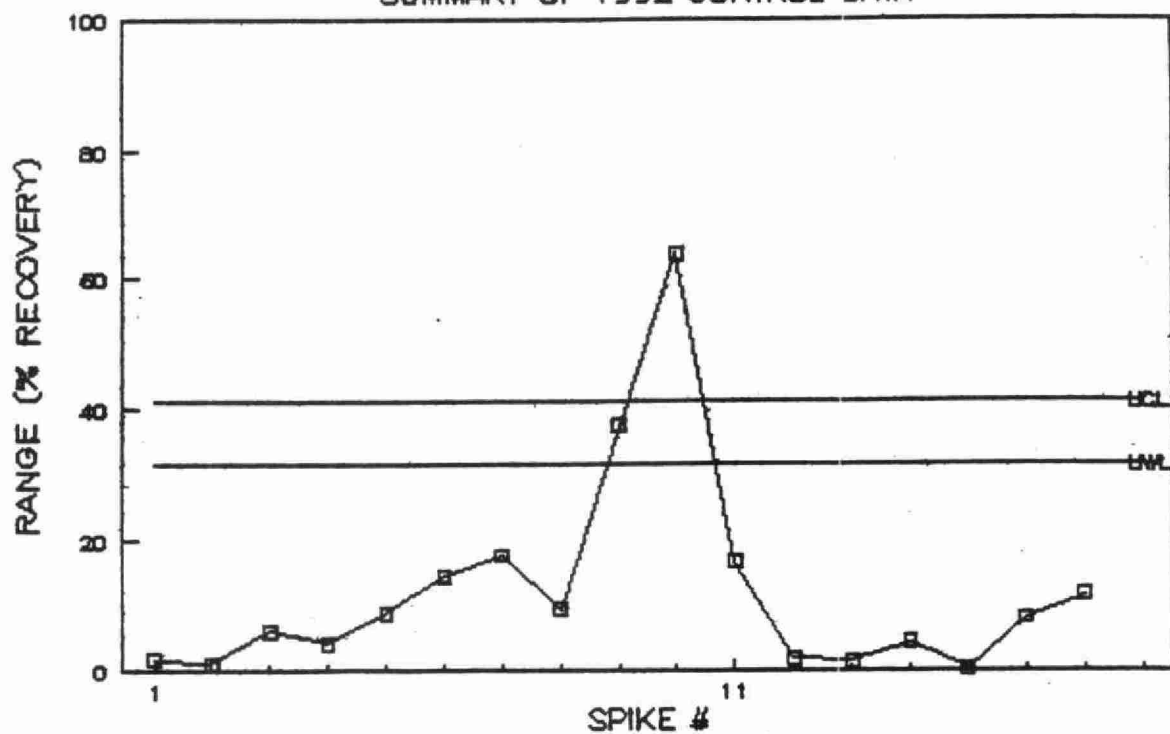
PWRFA (db) : OLEIC

SUMMARY OF 1992 CONTROL DATA



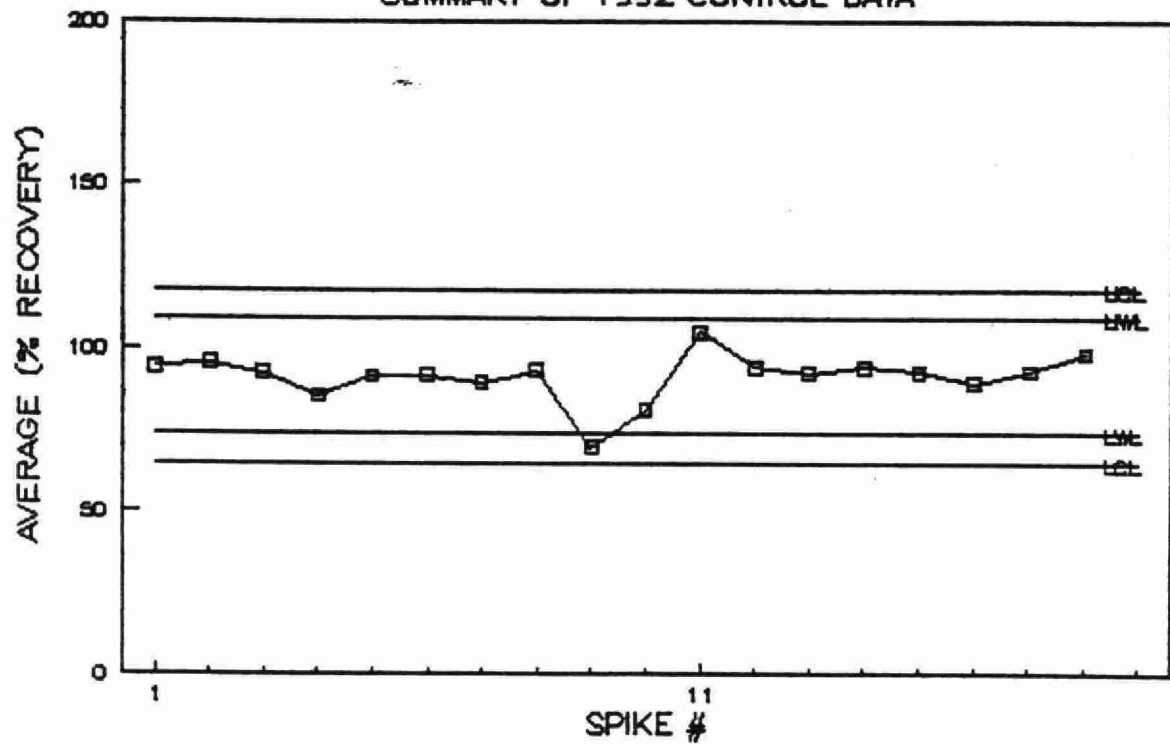
PWRFA (db) : OLEIC

SUMMARY OF 1992 CONTROL DATA



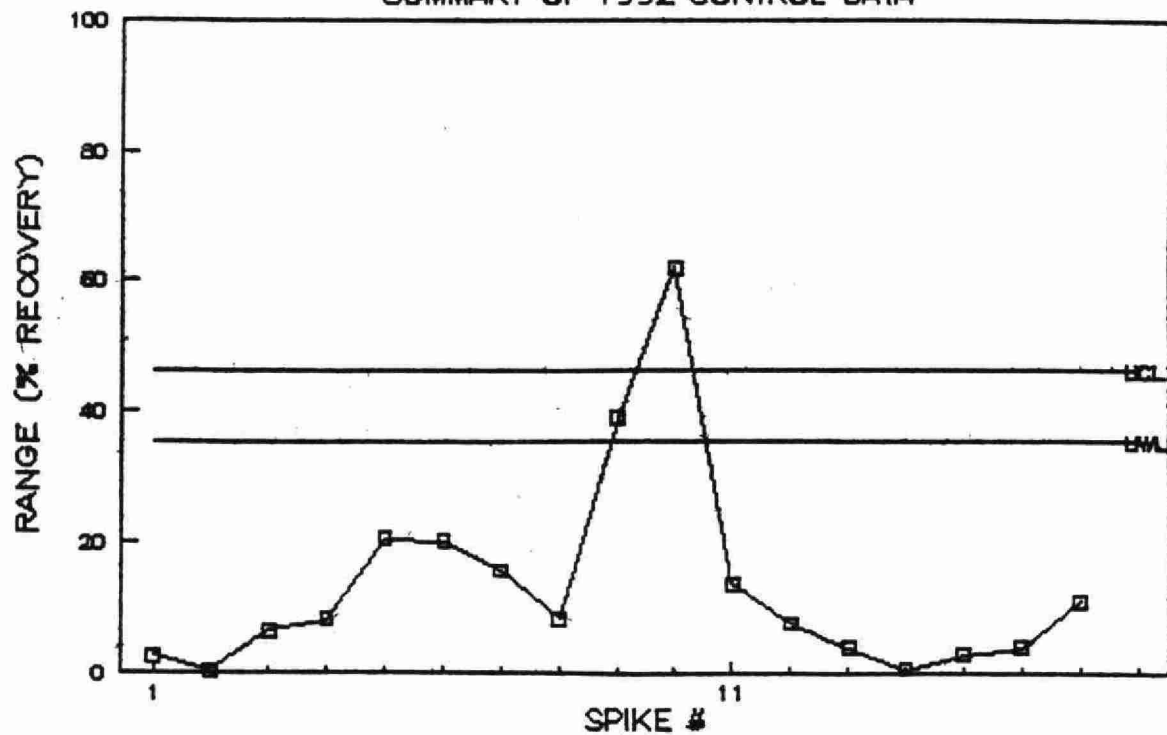
PWRFA (db) : STEAR

SUMMARY OF 1992 CONTROL DATA



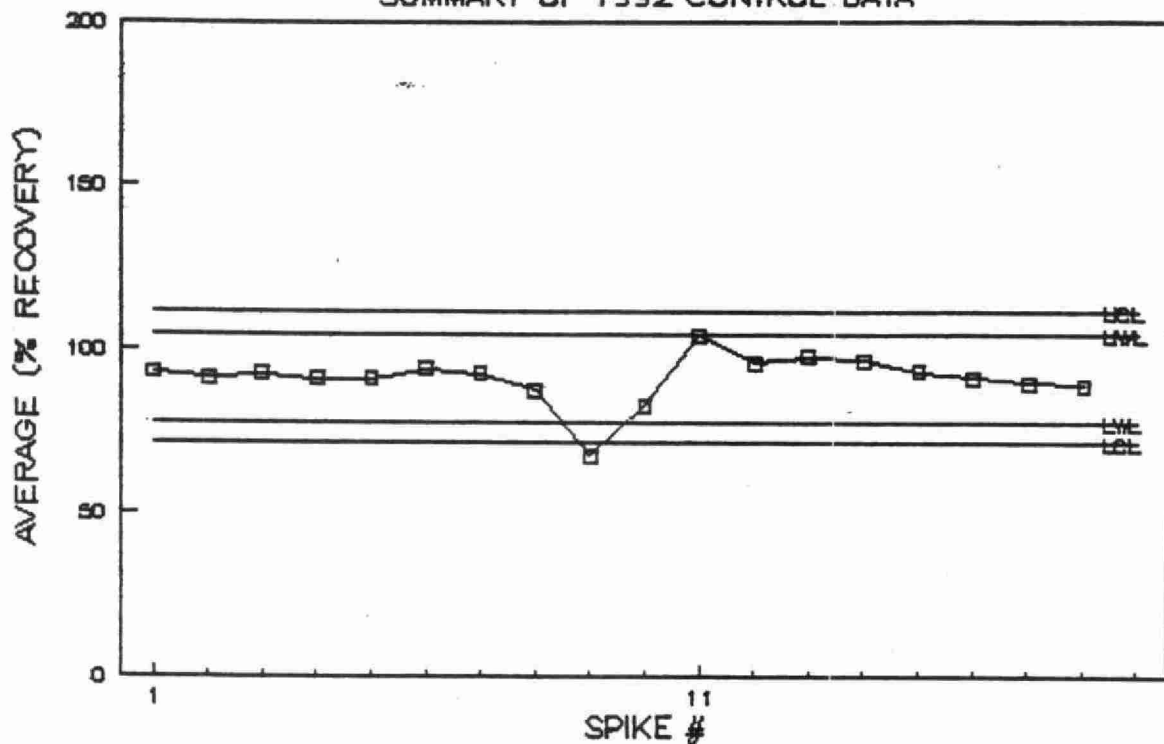
PWRFA (db) : STEAR

SUMMARY OF 1992 CONTROL DATA



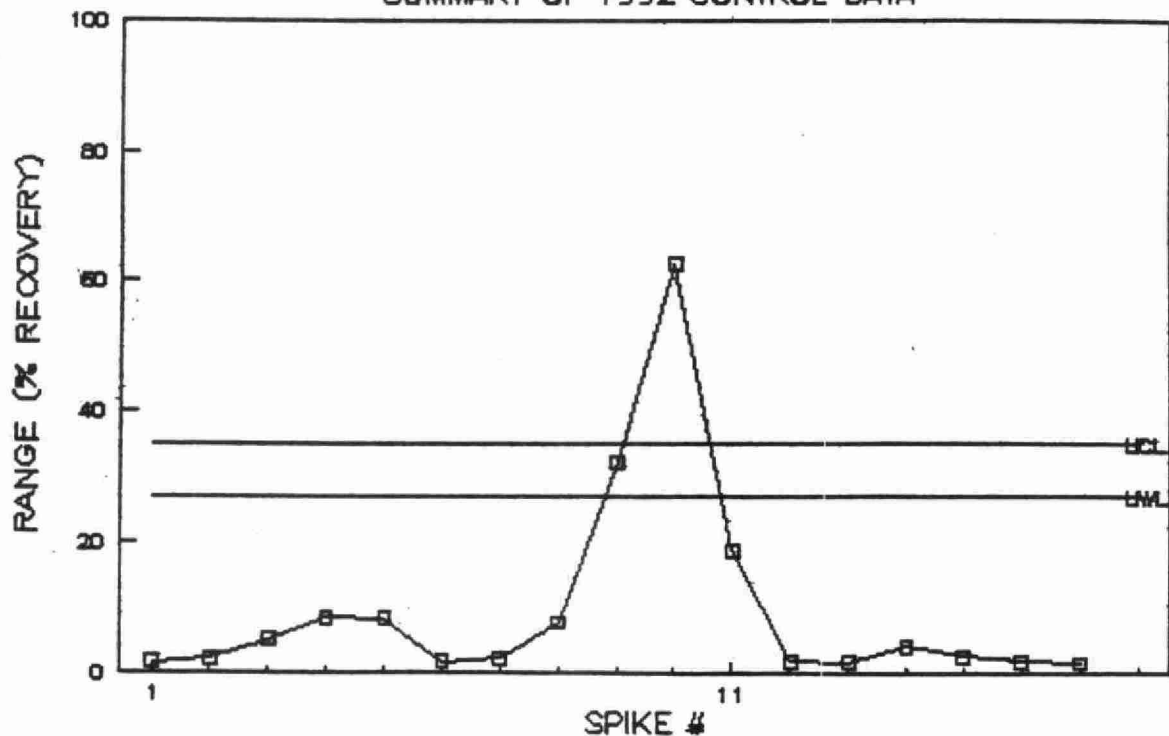
PWRFA (db) : PIMAR

SUMMARY OF 1992 CONTROL DATA



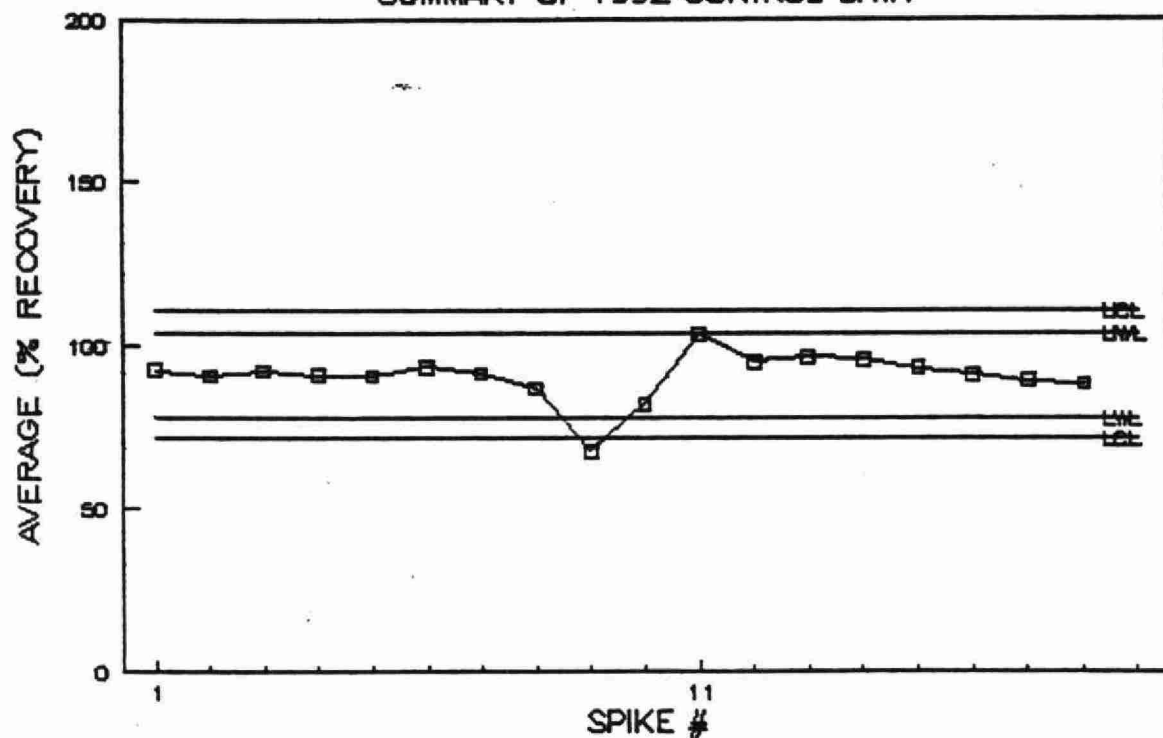
PWRFA (db) : PIMAR

SUMMARY OF 1992 CONTROL DATA



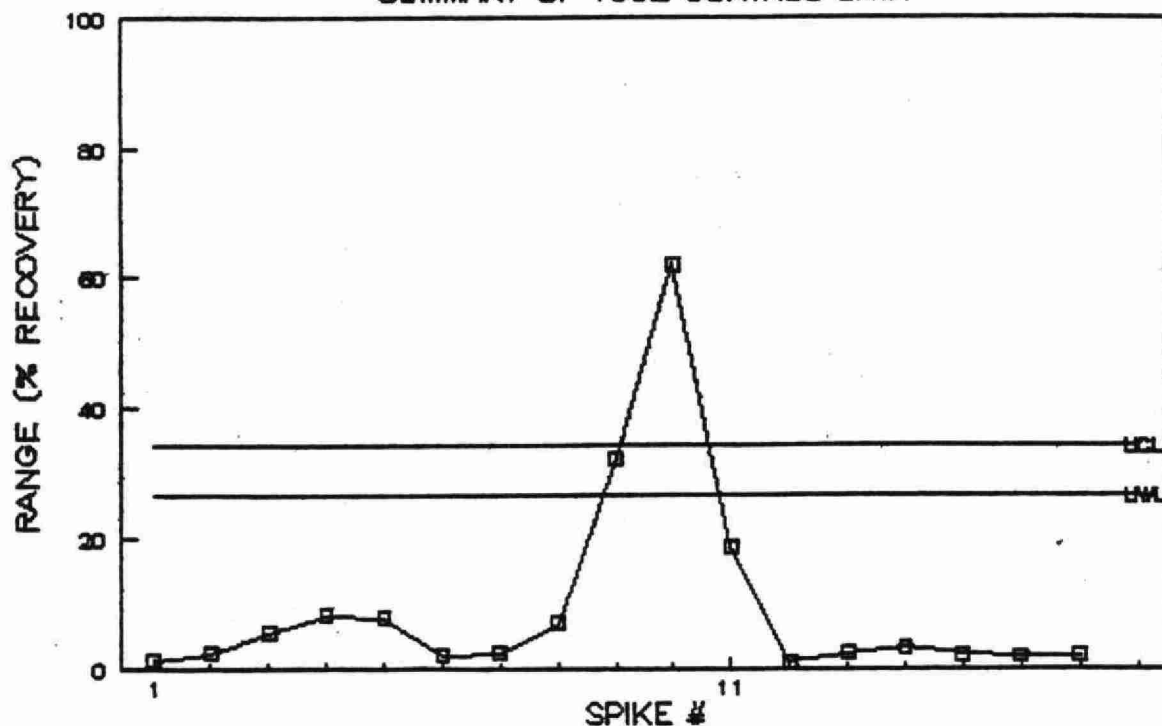
PWRFA (db) : SANPIM

SUMMARY OF 1992 CONTROL DATA



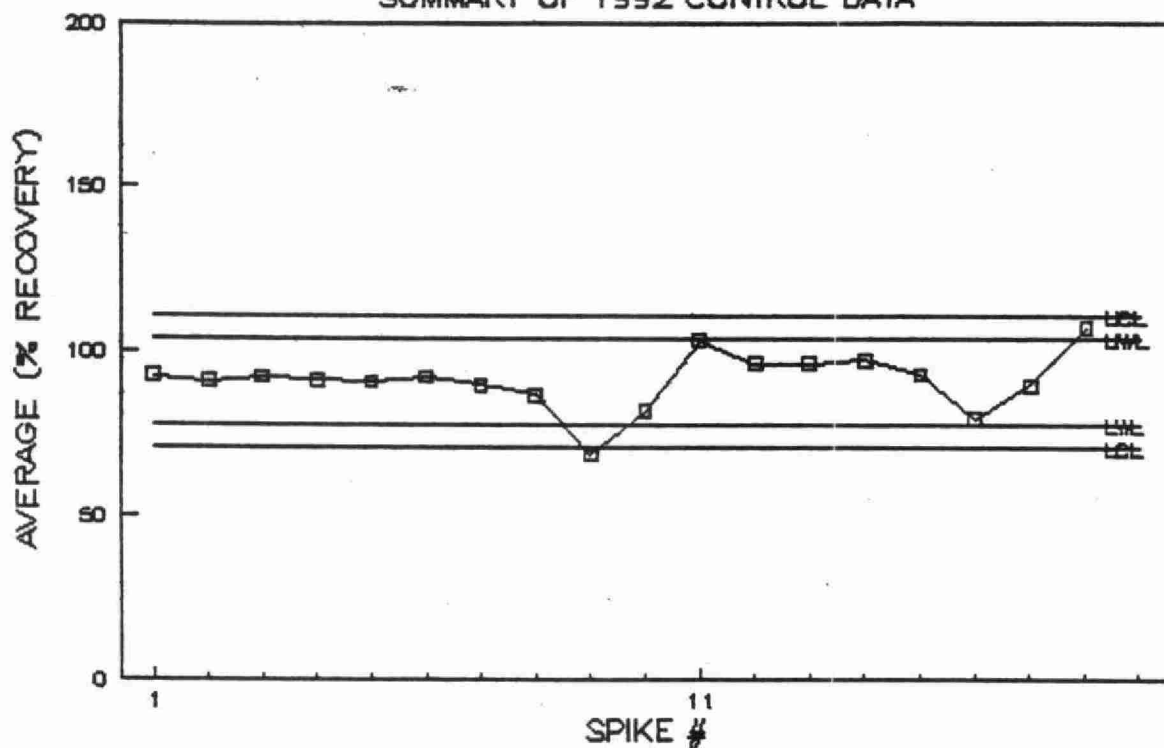
PWRFA (db) : SANPIM

SUMMARY OF 1992 CONTROL DATA



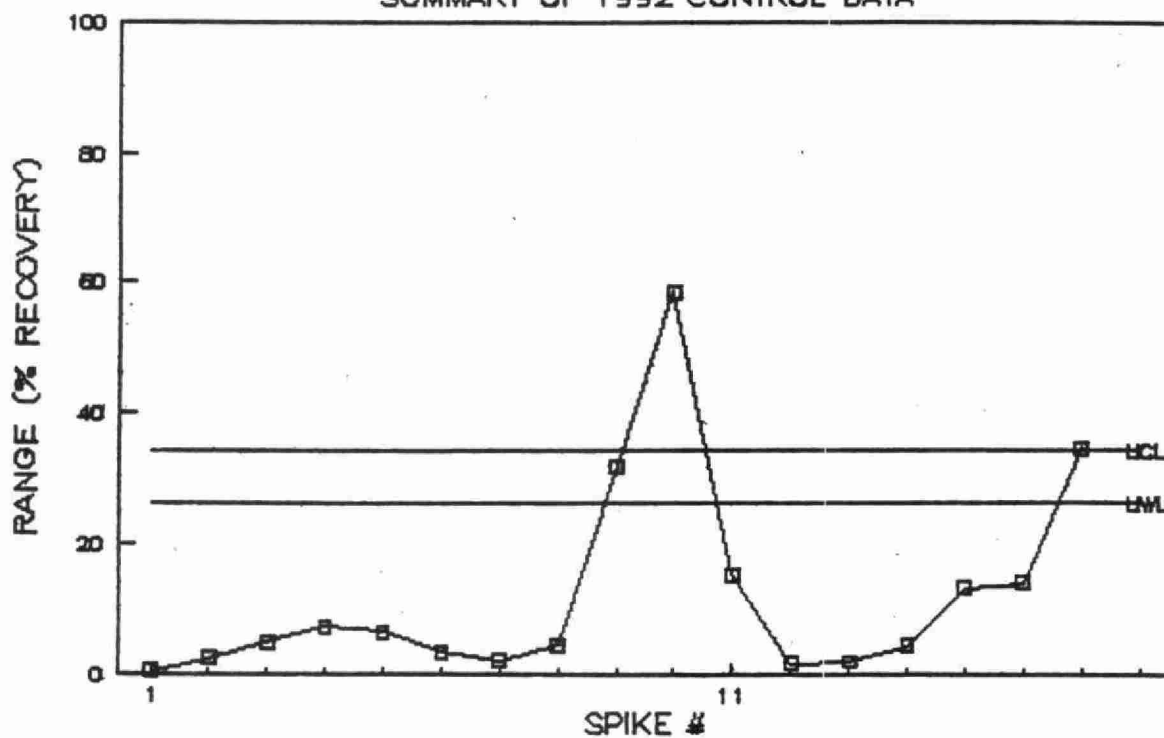
PWRFA (db) : ISOPIM

SUMMARY OF 1992 CONTROL DATA



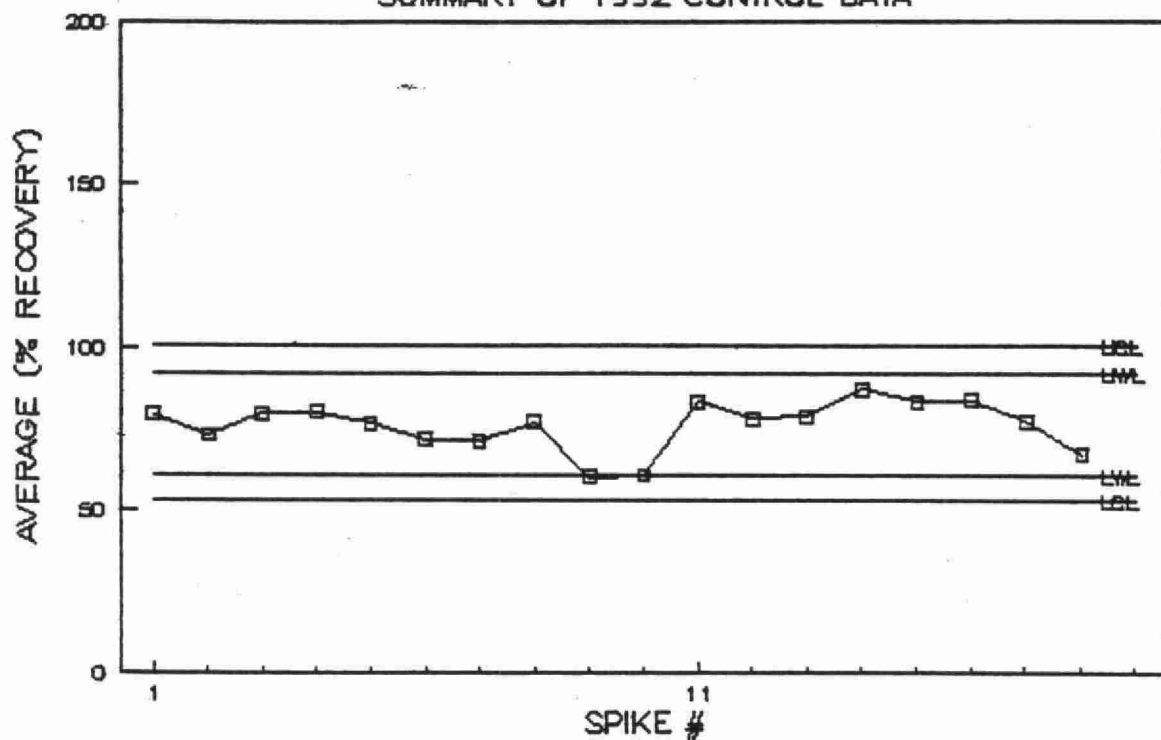
PWRFA (db) : ISOPIM

SUMMARY OF 1992 CONTROL DATA



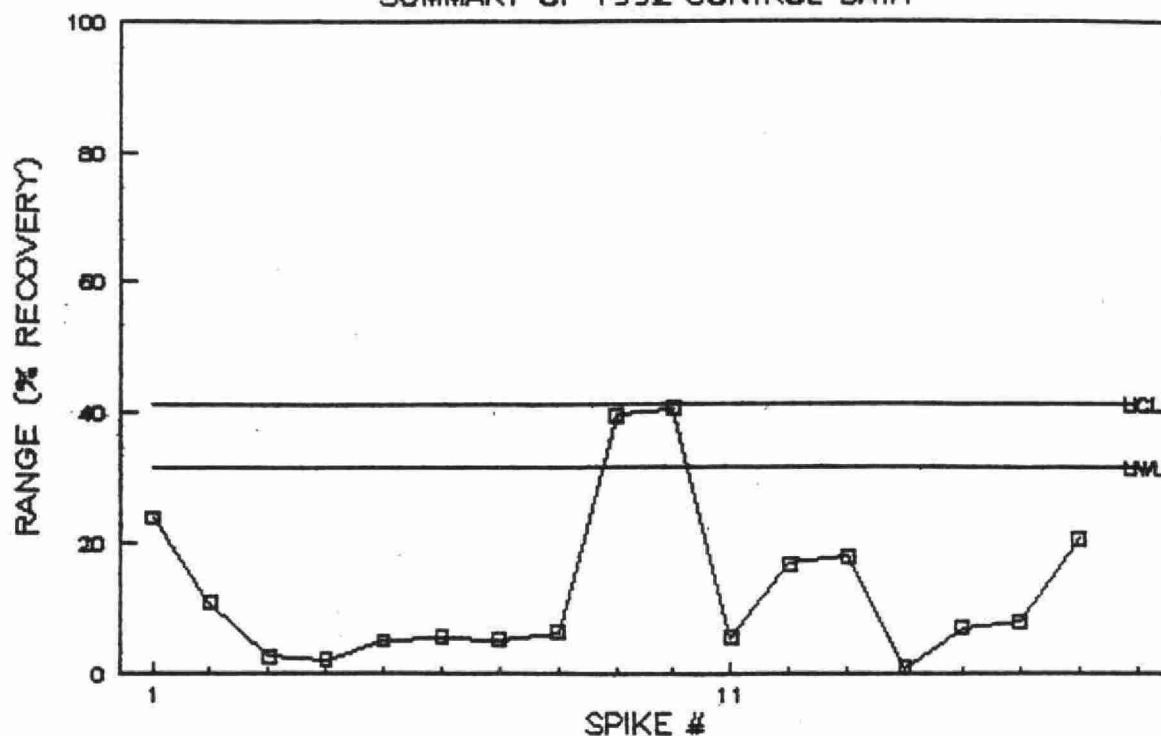
PWRFA (db) : PALLEV

SUMMARY OF 1992 CONTROL DATA



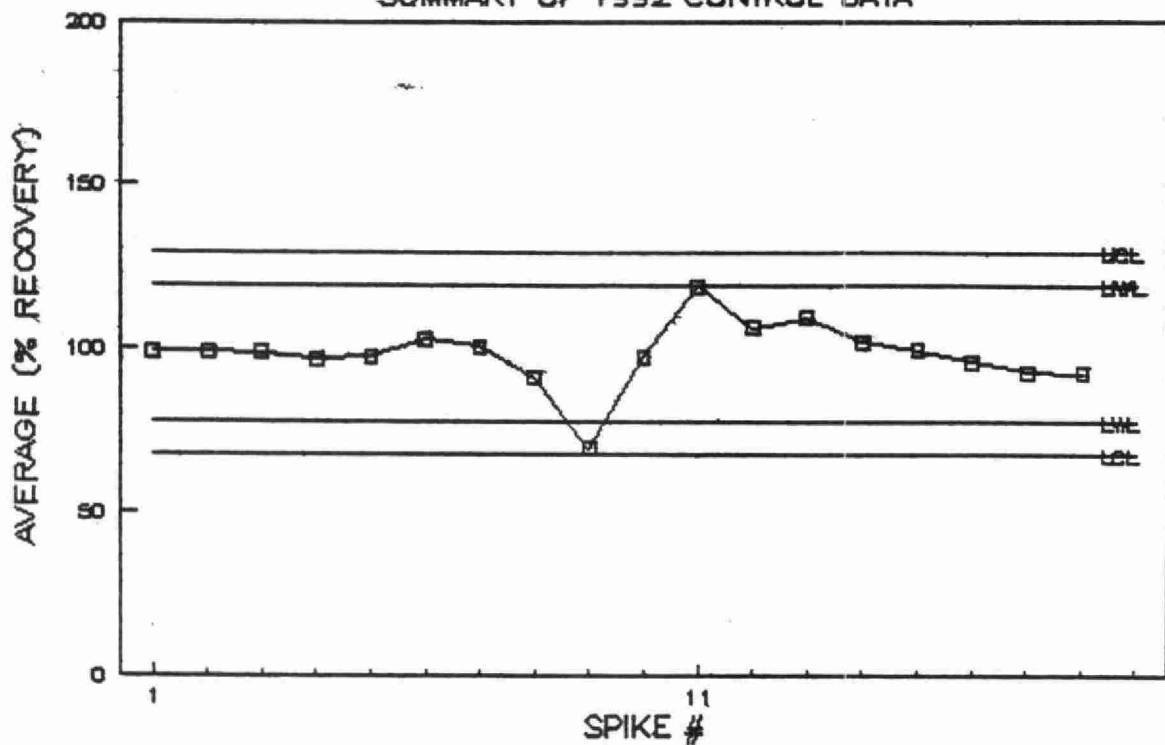
PWRFA (db) : PALLEV

SUMMARY OF 1992 CONTROL DATA



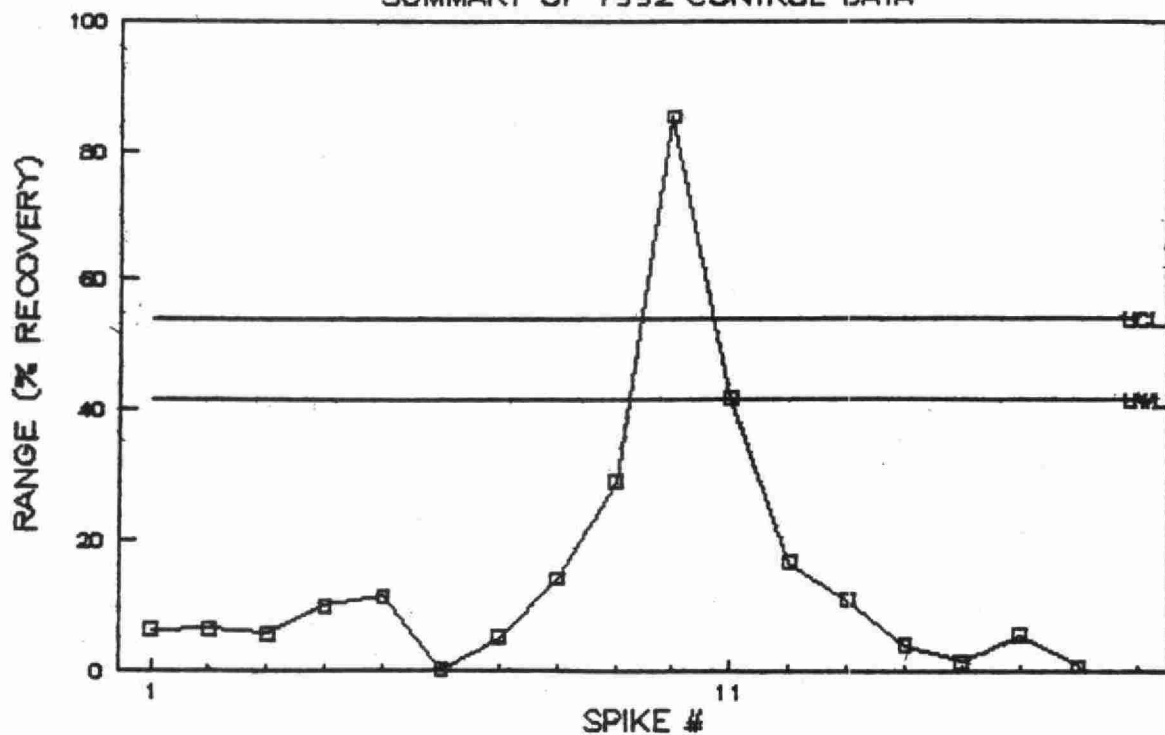
PWRFA (db) : DHAB

SUMMARY OF 1992 CONTROL DATA



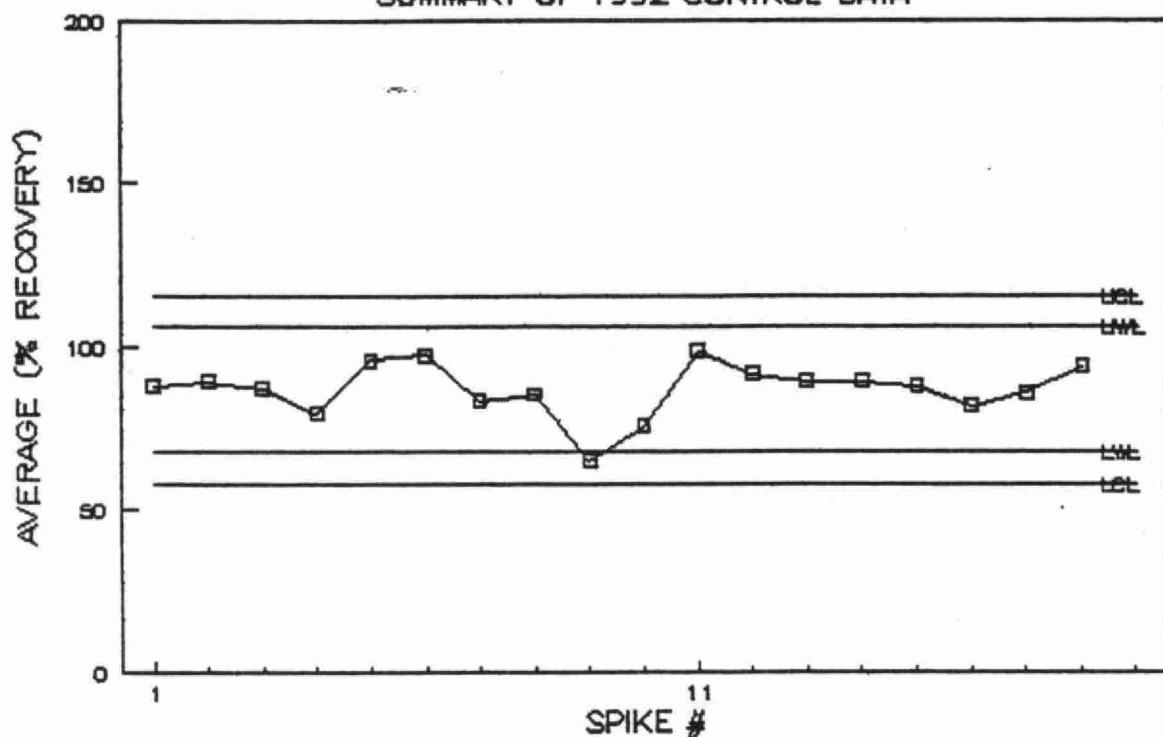
PWRFA (db) : DHAB

SUMMARY OF 1992 CONTROL DATA



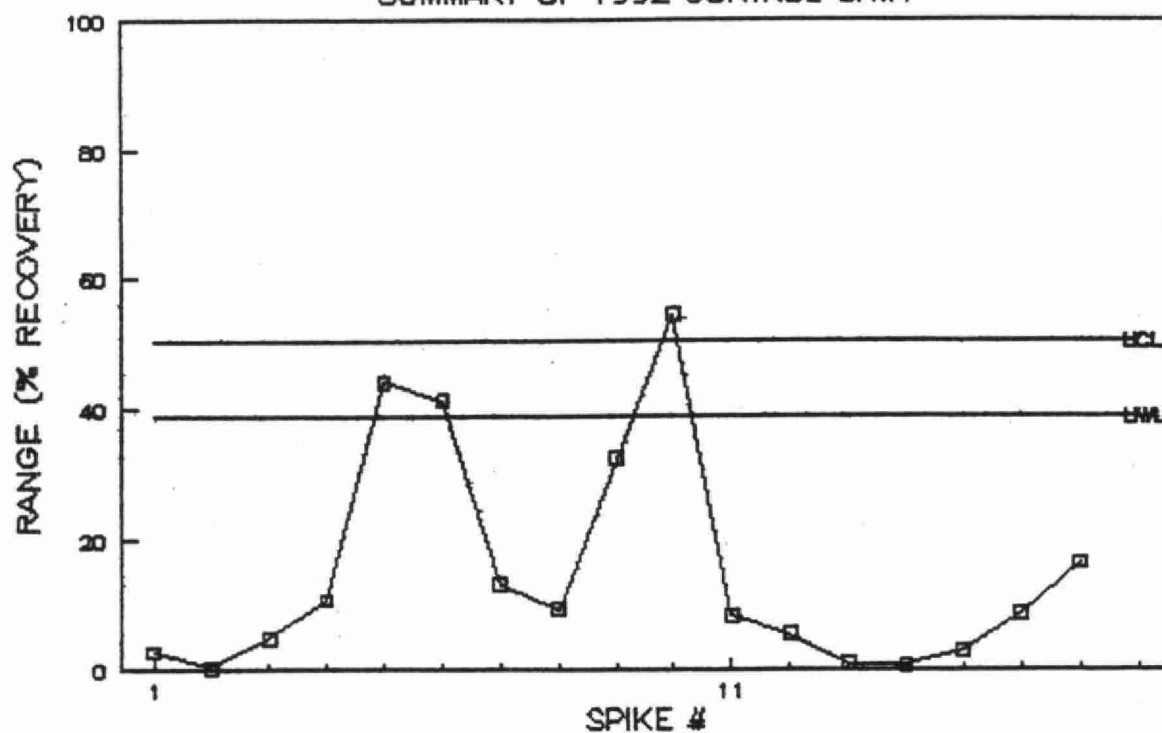
PWRFA (db) : ARACH

SUMMARY OF 1992 CONTROL DATA



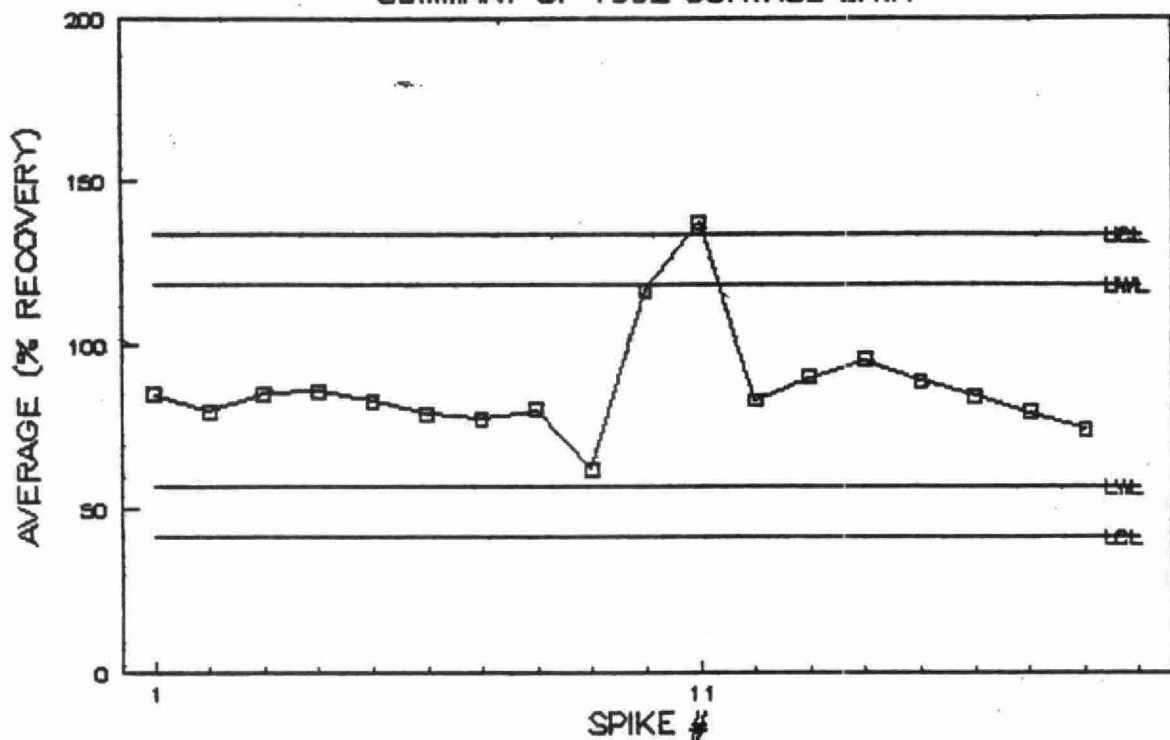
PWRFA (db) : ARACH

SUMMARY OF 1992 CONTROL DATA



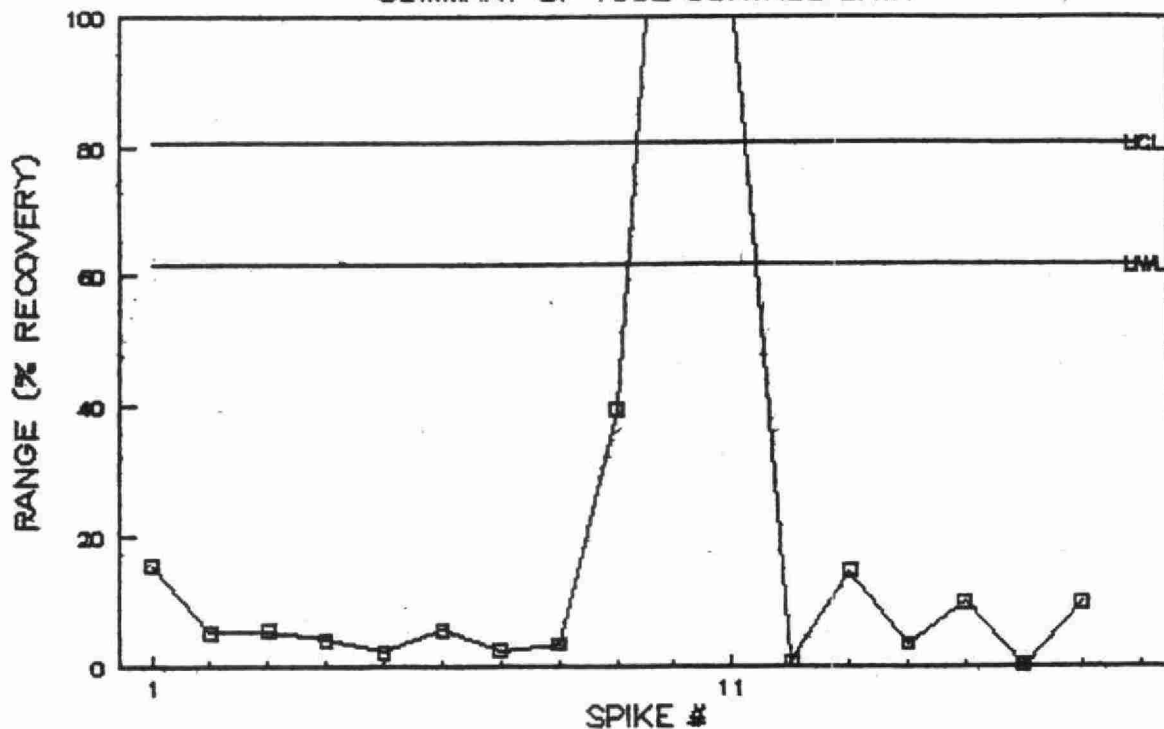
PWRFA (db) : ABIET

SUMMARY OF 1992 CONTROL DATA



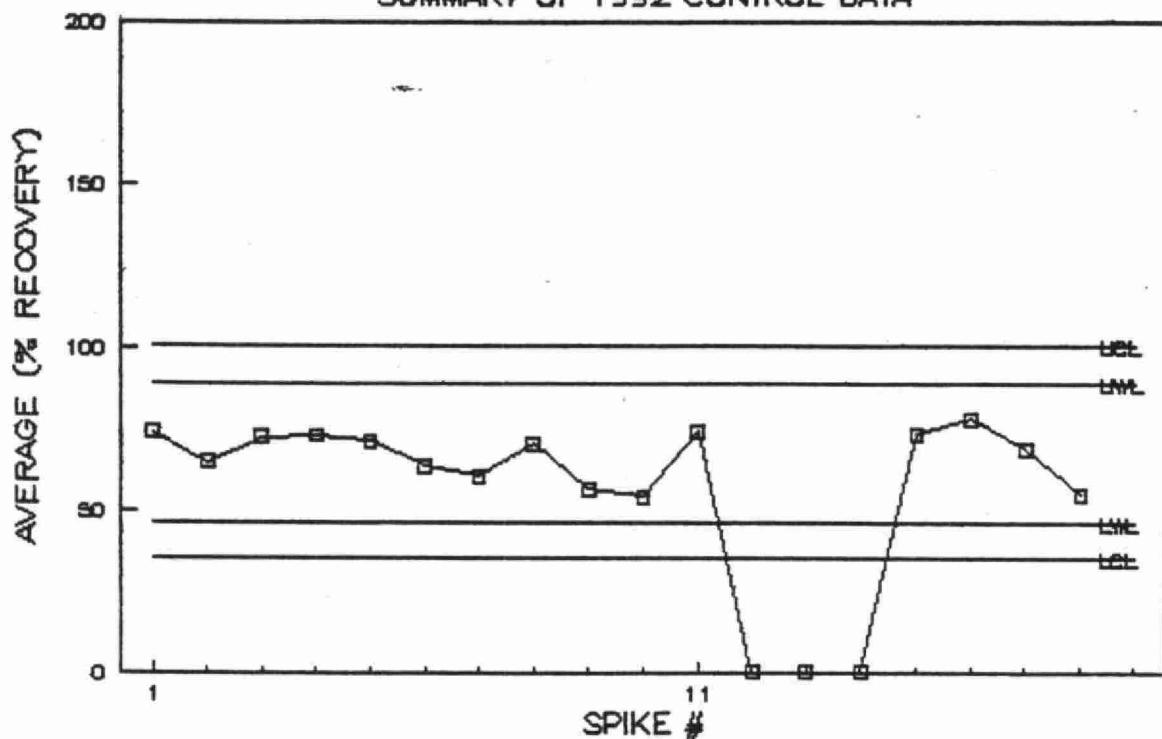
PWRFA (db) : ABIET

SUMMARY OF 1992 CONTROL DATA



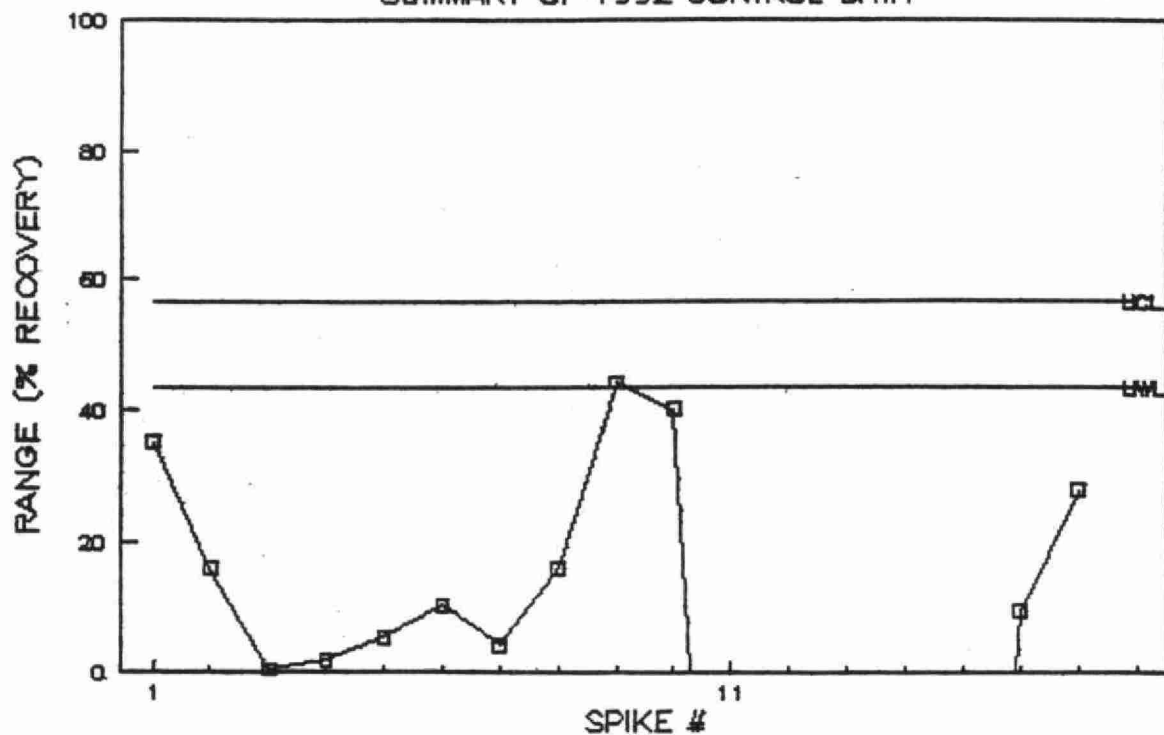
PWRFA (db) : NEOAB

SUMMARY OF 1992 CONTROL DATA



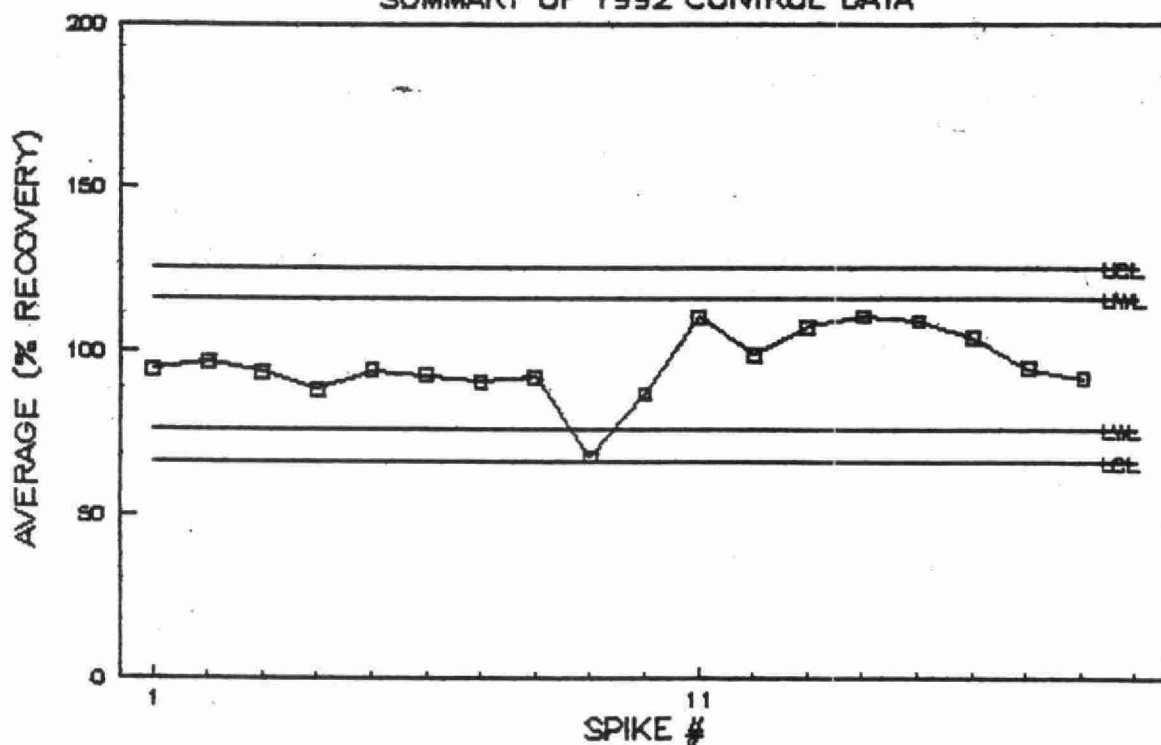
PWRFA (db) : NEOAB

SUMMARY OF 1992 CONTROL DATA



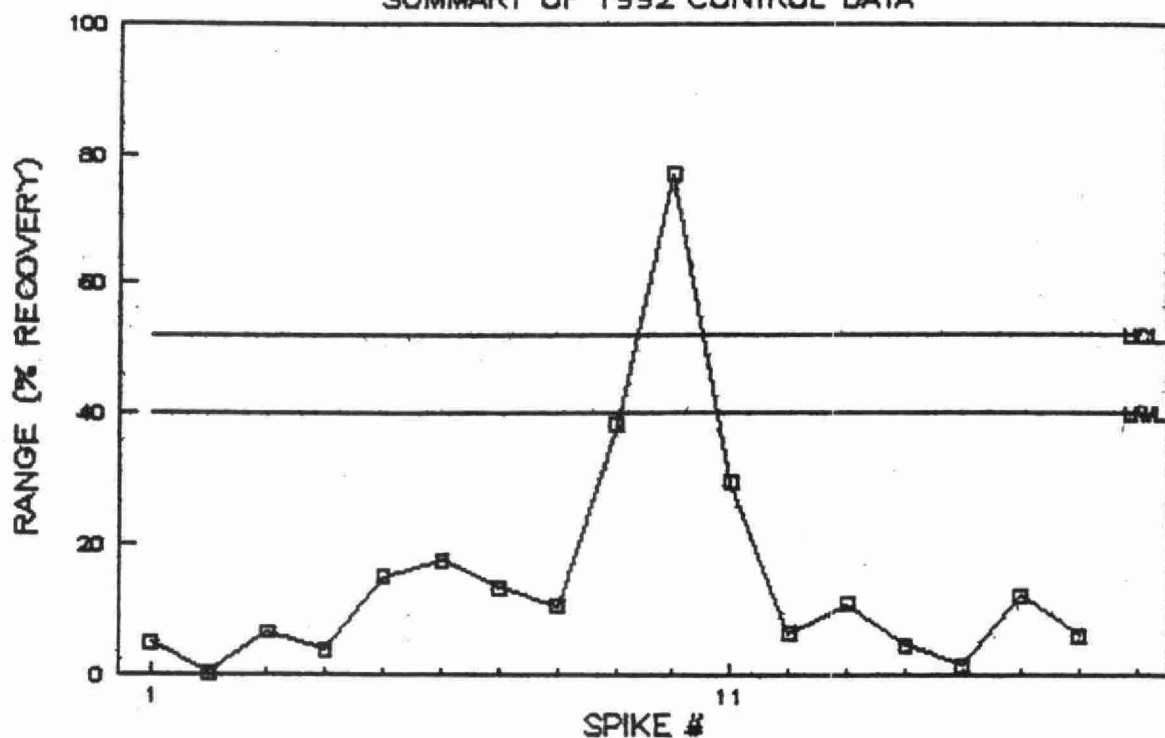
PWRFA (db) : DCLSTE

SUMMARY OF 1992 CONTROL DATA



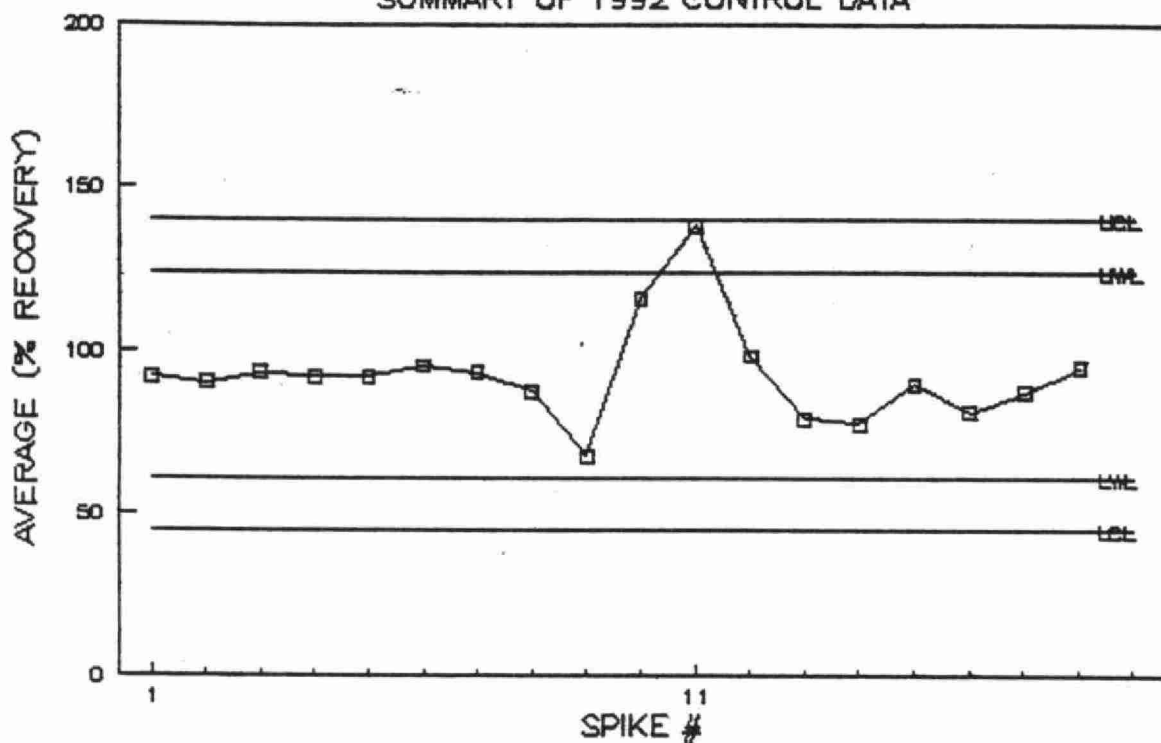
PWRFA (db) : DCLSTE

SUMMARY OF 1992 CONTROL DATA



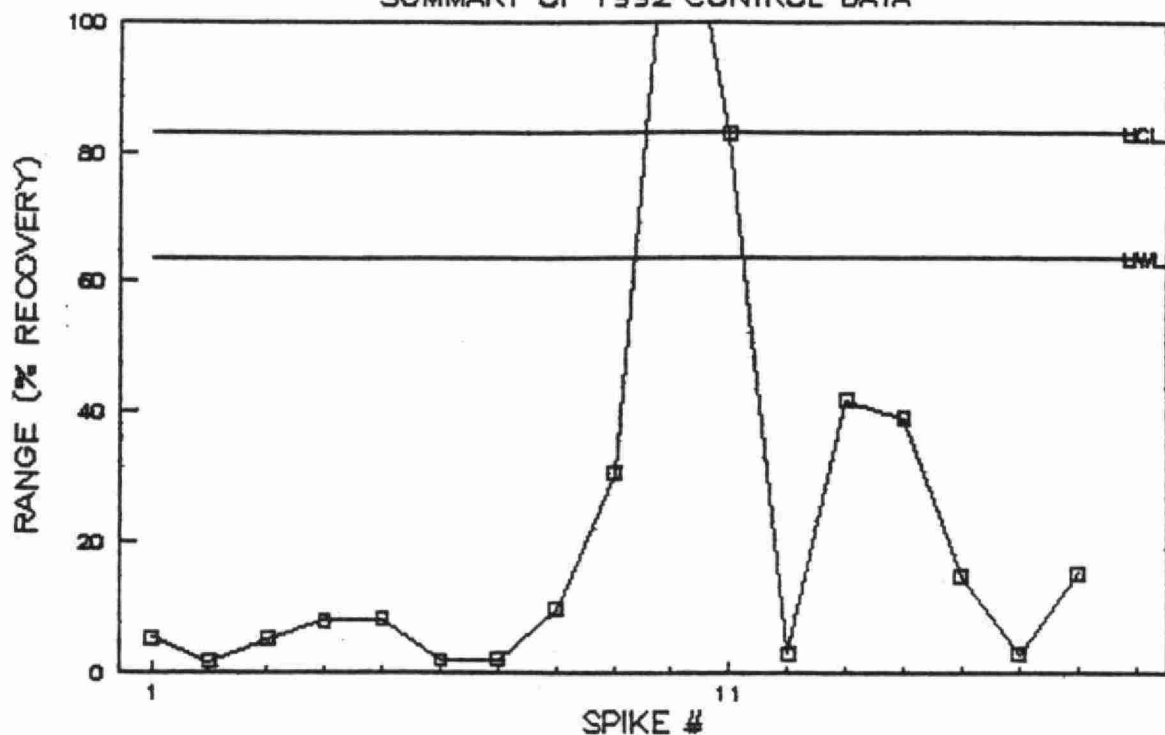
PWRFA (db) : CLDHAB

SUMMARY OF 1992 CONTROL DATA



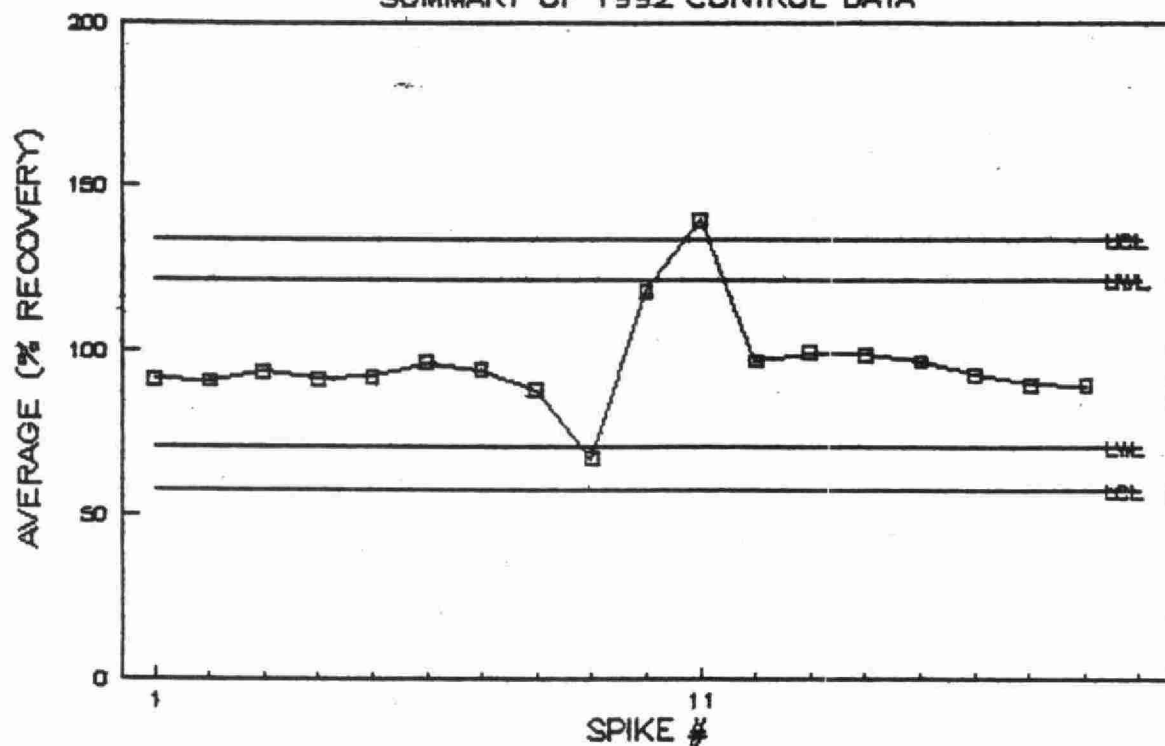
PWRFA (db) : CLDHAB

SUMMARY OF 1992 CONTROL DATA



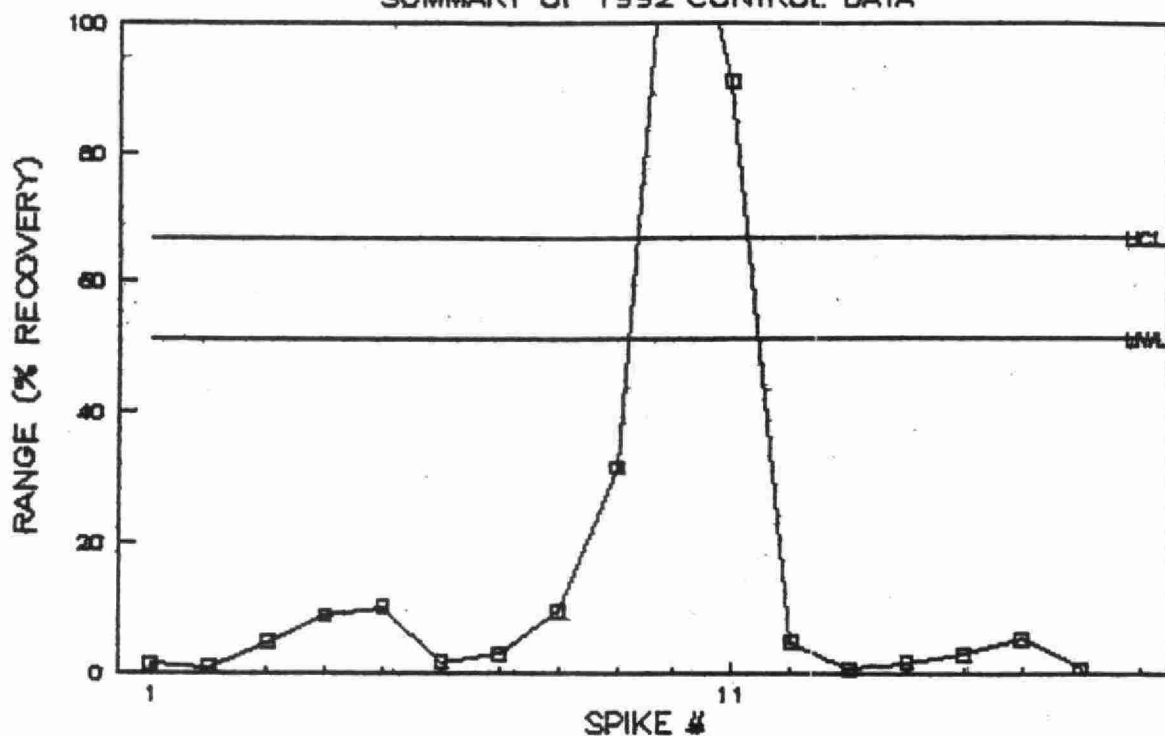
PWRFA (db) : DCDHAB

SUMMARY OF 1992 CONTROL DATA



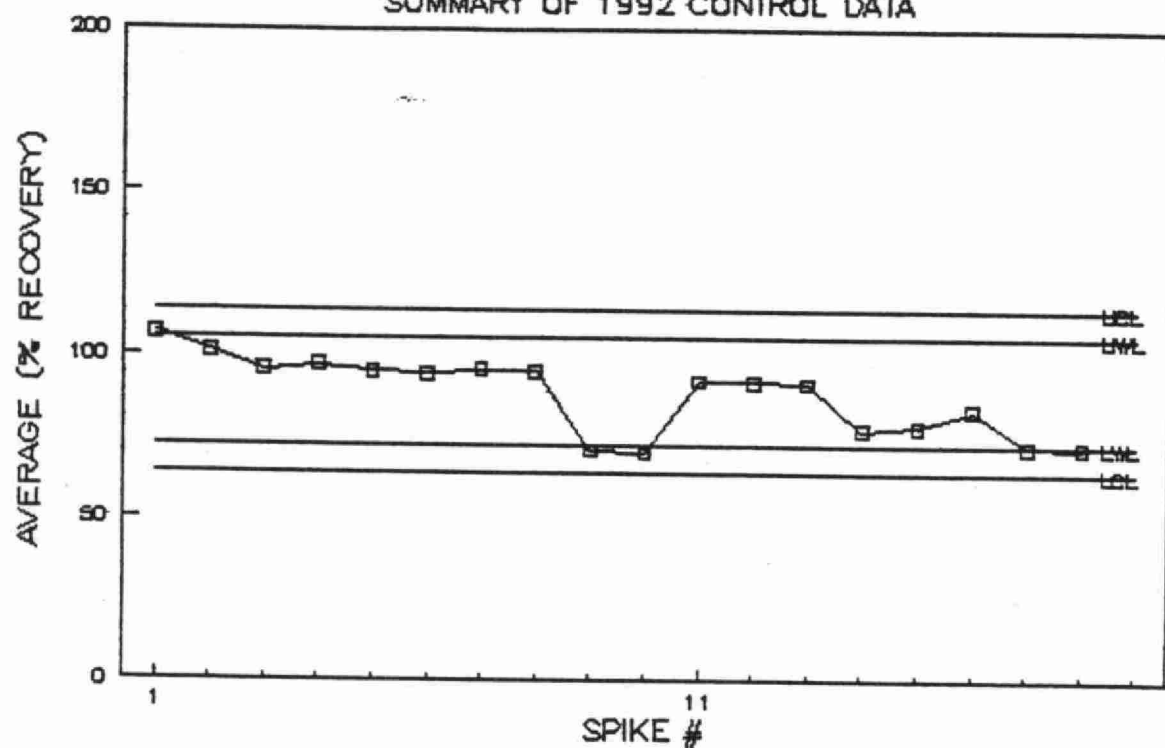
PWRFA (db) : DCDHAB

SUMMARY OF 1992 CONTROL DATA



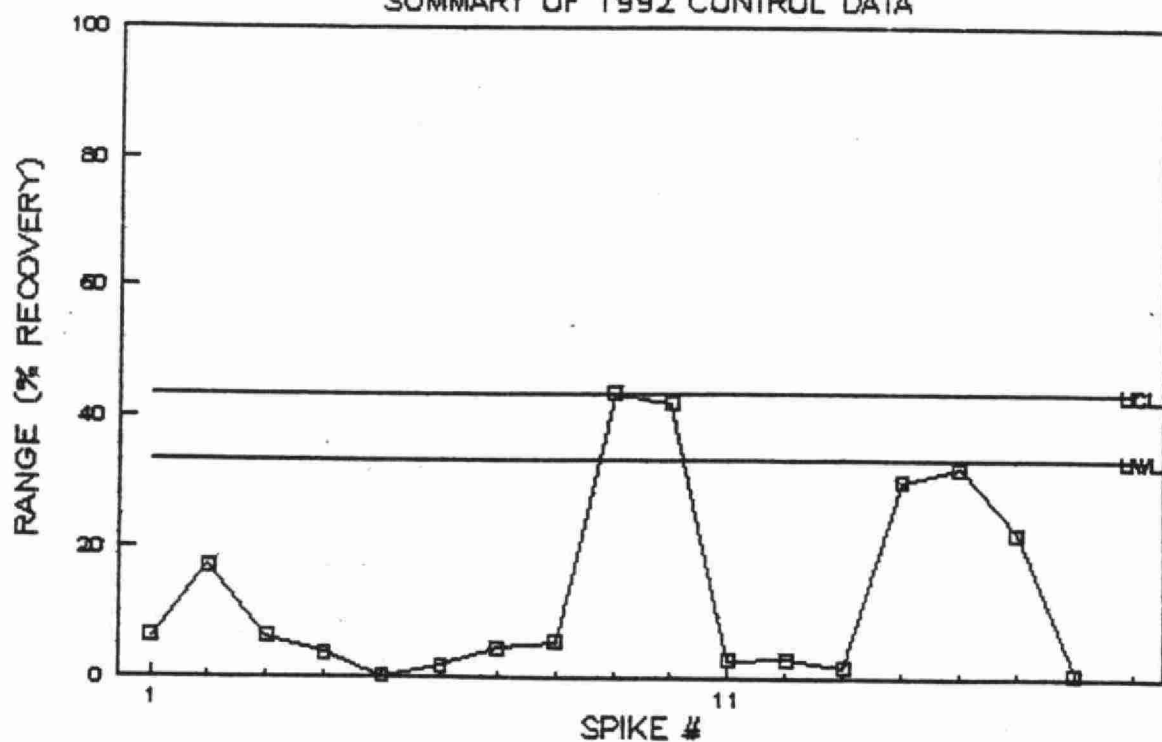
PWRFA (db) : OMP

SUMMARY OF 1992 CONTROL DATA



PWRFA (db) : OMP

SUMMARY OF 1992 CONTROL DATA



ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: TOMBAN-E3265A

SAMPLE TYPE: INDUSTRIAL/
MUNICIPAL WASTE

UNIT: WASTEWATER

SUPERVISOR: Y. JONES

PRINCIPLE OF METHOD:

Extractable 2,4-dinitrophenol and 4,6-dinitro-o-cresol are commercially used for insecticides and herbicides; as a result these organic chemicals may be found in industrial and municipal waste,

The method consists of acidifying the sample to pH<2 and extraction with dichloromethane. The extracts are then dried over sodium sulphate, evaporated on a rotary evaporator and vortexed and methylated using diazomethane. The analysis is performed using a Mass Selective Detector with S.I.M. Data capture

PARAMETERS MEASURED:

Misa Extractables: Acetylated Phenolics

Parameters	Test Code	Parameters	Test Code
2,4-dinitrophenol	PM24MP	4,6-dinitro-o-cresol	PM46DC

REPORTING RESULTS:

Results are reported in ug/L.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC samples.

PERFORMANCE:

The performance limits are +/- 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Interferences are not known since the MSD is used in Single Ion Monitoring (SIM) mode.

Samples must be aqueous in nature and 1L in volume. The sample bottle must be amber in colour with a teflon or foil-lined cap.

ANALYTICAL PROCEDURE SUMMARY

TRACE ORGANICS SECTION

METHOD CODE: TOMPAH -E3209A

SAMPLE TYPE: INDUSTRIAL/
MUNICIPAL WASTE

UNIT: WASTEWATER

SUPERVISOR: Y. JONES

PRINCIPLE OF METHOD:

The parameters in this method cover a wide range of base neutral and acidic organics found in industrial and municipal waters. The method consists of an in-situ acetylation and extraction with dichloromethane. The extracts are then dried over sodium sulphate, evaporated on a rotary evaporator and vortex. The analysis is performed using a Mass Selective Detector with S.I.M. Data capture

PARAMETERS MEASURED:

Misa Extractables: Acetylated Phenolics

Parameters	Test Code	Parameters	Test Code
phenol	PMPHEN	2,4,6-trichlorophenol	X3246
o-cresol	PMOCRE	2,3,5,6-tetrachlorophenol	X32356
m-cresol	PMMCRC	2,3,4,6-tetrachlorophenol	X32346
p-cresol	PMPCRE	2,3,4,5-tetrachlorophenol	X32345
2-chlorophenol	X30010	pentachlorophenol	X3PCPH
2,4,-dimethylphenol	PM24DMP	3,4,5-trichlorophenol	X3345
p-chloro-m-cresol	PMPCMC	4-nitrophenol	PM4NP
2,4-dichlorophenol	PM24DP	2,6-dichlorophenol	PM26DP
2,3,4-trichlorophenol	X3234	2,4,5-trichlorophenol	X3245
bis(2-chloroethyl) ether	PMB2EE	pyrene	PNPYR
bis(2chloroisopropyl) ether	PMB2IE	benzylbutylphthalate	PMBBP
n-nitroso-di-N-propylamine	PMNNP	benzo (a) anthracene	PNBAA
naphthalene	PNNAPH	chrysene	PNCHRY
2-methylnapthalene	PN2MNA	di-n-octylphthalate	PMDNOP
1-methylnapthalene	PN1MNA	benzo (b) fluoranthene	PNBBFA
1-chloronapthalene	PN1CNP	benzo (k) fluoranthene	PNBKF
2-chloronapthalene	PN2CNP	benzo (a) pyrene	PNBAAP
acenaphthylene	PNACNE	dibenzo (a,h) anthracene	PNDAHA
2,6-dinitrotoluene	PM26DNT	indeno (1,2,3-ed) pyrene	PNIMP
acenaphthene	PNACNY	benzo (g,h,i) perylene	PNGHIP
4-chlorophenyl phenylether	PM4CPE	5-nitroacenaphthene	PN5NAN
2,4-dinitrotoluene	PM24DT	camphene	PMCAMP
fluorane	PNFLUO	indole	PMINDL
n-nitrododiphenylamine	PMNND	perylene	PNPERY
4-bromophenylphenylether	PM4BPE	diphenylether	PMDPE
phenanthrene	PNPHEN	n-nitrosodimethylamine	N20010
anthracene	PNANTH	bis (2-ethylhexy) phthalate	PMBEHP
di-n-butylphthalate	PMDNBP	bis (2-chloroethoxy) methane	PMB2EM
fluoranthene	PNFLAM	biphenyl	PNBIPH

REPORTING RESULTS:

Results are reported in ug/L.

METHOD CONTROL:

A QC sample is prepared independently of the calibration standard and is analyzed daily to assess method performance. Surrogates are also used to evaluate method performance.

PARAMETERS:

All target parameters are controlled via the QC samples.

PERFORMANCE:

The performance limits are ± 3 Std. Deviation limits of the average 1992 QC sample results. Control limits are shown as solid lines on either side of the average.

REMARKS:

Interferences are not known since the MSD is used in Single Ion Monitoring (SIM) mode. Samples must be aqueous in nature and 1L in volume. The sample bottle must be amber in colour with a teflon or foil-lined cap.

UNIT: WASTEWATER
 WORKSTATION: TOMBAN/TOMPAH
 TIME PERIOD: JAN.- DEC. 1992

MATRIX: WATER
 INSTRUMENT: GC/MSD#1
 NO. OBSERVATIONS: 84

YEARLY CALCULATION

PARAMETER COMPOUND	CONCENTRATION UG/L	AVG. SPK. % REC.	STD.DEV. % REC.	% C.V.
1. PMCAMP	: 2.0	: 122.07	: 79.01	: 64.72
2. PMB2EE	: 2.0	: 106.96	: 27.47	: 28.68
3. PMB2IE	: 2.0	: 102.74	: 24.08	: 21.30
4. d6-PHE	: 1.0	: 106.40	: 28.49	: 29.83
5. PMPHEN	: 0.97	: 122.78	: 86.56	: 70.50
6. PMNNP	: 2.0	: 106.91	: 23.60	: 22.07
7. PMOCRE	: 1.15	: 90.22	: 26.28	: 29.14
8. PMB2EM	: 2.0	: 104.01	: 21.77	: 20.93
9. PMMCRE	: 1.10	: 99.28	: 22.85	: 23.02
10. PMPCRE	: 0.99	: 103.01	: 26.31	: 25.54
11. d8-NAP	: 1.0	: 101.22	: 24.17	: 23.88
12. PNNAPH	: 1.0	: 102.28	: 21.17	: 20.70
13. X30010	: 1.17	: 99.50	: 18.56	: 18.66
14. d3-DNP	: 1.0	: 86.12	: 63.85	: 74.15
15. PM24DMP	: 2.09	: 76.04	: 38.60	: 50.76
16. PMIND	: 2.0	: 120.66	: 55.36	: 45.88
17. PN2MNA	: 1.0	: 101.73	: 19.71	: 19.37
18. PN1MNA	: 1.01	: 99.54	: 19.20	: 19.29
19. PM26DP	: 1.02	: 97.32	: 17.17	: 17.64
20. PMPCNC	: 1.01	: 95.02	: 18.81	: 19.80

UNIT: WASTEWATER
 WORKSTATION: Tomban/Tompah
 TIME PERIOD: JAN.- DEC. 1992

MATRIX: WATER
 INSTRUMENT: GC/MSD#1
 NO. OBSERVATIONS: 84

YEARLY CALCULATION

PARAMETER COMPOUND	CONCENTRATION		AVG. SPK. % REC.	STD. DEV. % REC>	% C.V.
21. d3-DCP	: 1.0	: 101.60	: 25.65	: 25.25	
22. PM24DP	: 1.10	: 101.00	: 32.35	: 32.02	
23. PN2CNA	: 1.02	: 101.77	: 18.74	: 18.42	
24. PNBIPH	: 1.00	: 95.54	: 22.52	: 23.58	
25. PNICNP	: 1.02	: 99.40	: 17.97	: 18.07	
26. d10-DPE	: 1.0	: 99.74	: 21.53	: 21.59	
27. PMDPE	: 2.03	: 100.87	: 18.49	: 18.33	
28. X3246	: 0.99	: 100.00	: 15.95	: 15.95	
29. PNACNY	: 1.01	: 100.24	: 17.25	: 17.21	
30. PM26DT	: 2.0	: 99.19	: 24.97	: 25.17	
31. d4-4NP	: 1.0	: 103.24	: 23.29	: 22.56	
32. PM4NP	: 1.64	: 96.57	: 20.82	: 21.56	
33. PNACNE	: 1.03	: 99.81	: 17.10	: 17.14	
34. X3245	: 1.02	: 100.03	: 16.56	: 16.56	
35. X3235	: 1.01	: 101.86	: 18.25	: 17.92	
36. d3-DNT	: 1.0	: 101.31	: 21.48	: 21.21	
37. PM24DT	: 2.03	: 97.18	: 21.39	: 21.01	
38. X3234	: 1.0	: 97.78	: 17.37	: 17.76	
39. PNFLUO	: 1.03	: 102.38	: 15.05	: 14.70	
40. PM4CPE	: 2.00	: 103.77	: 16.81	: 16.20	
41. NIDPHA	: 2.05	: 112.40	: 60.34	: 53.69	

UNIT: WASTEWATER MATRIX: WATER
 WORKSTATION: TOMBAN/TOMPAH INSTRUMENT: GC/MDS#1
 TIME PERIOD: JAN.-DEC. 1992 NO. OBSERVATIONS: 84

YEARLY CALCULATIONS

PARAMETER COMPOUND	CONCENTRATION UG/L	AVG. SPK. % REC.	STD.DEV. % REC.	%C.V.
42. X32356	: 1.05	: 103.32	: 23.42	: 22.67
43. X32346	: 1.04	: 100.10	: 14.91	: 14.89
44. PM4BPE	: 2.00	: 103.51	: 17.05	: 14.89
45. X32345	: 0.98	: 101.06	: 15.28	: 15.12
46. d3-24DNP	: 1.0	: 106.93	: 95.18	: 89.01
47. PM24NP	: 24.0	: 110.71	: 88.19	: 79.66
48. PM46DC	: 12.0	: 79.25	: 30.08	: 37.96
49. PNPHEN	: 1.02	: 100.65	: 15.05	: 14.95
50. PNANTH	: 1.02	: 101.95	: 13.58	: 13.32
51. X3PCPH	: 1.03	: 100.49	: 16.71	: 16.63
52. PMDNBP	: 2.0	: 106.92	: 21.74	: 20.34
53. PN5NAN	: 2.0	: 103.16	: 24.03	: 23.29
54. PNFLAN	: 1.03	: 105.08	: 16.60	: 15.80
55. PNPYR	: 1.01	: 104.43	: 14.58	: 13.96
56. PMBBP	: 2.05	: 106.39	: 18.69	: 17.57
57. PNBAA	: 1.01	: 103.96	: 24.43	: 23.50
58. d12-CHR	: 1.0	: 108.96	: 28.07	: 25.76
59. PNCHRY	: 0.91	: 106.94	: 23.58	: 22.05
60. PMBEHP	: 2.02	: 113.34	: 29.56	: 26.08
61. PMDNOP	: 2.03	: 108.43	: 22.50	: 20.78
62. PNBFA	: 0.96	: 103.40	: 38.05	: 36.79

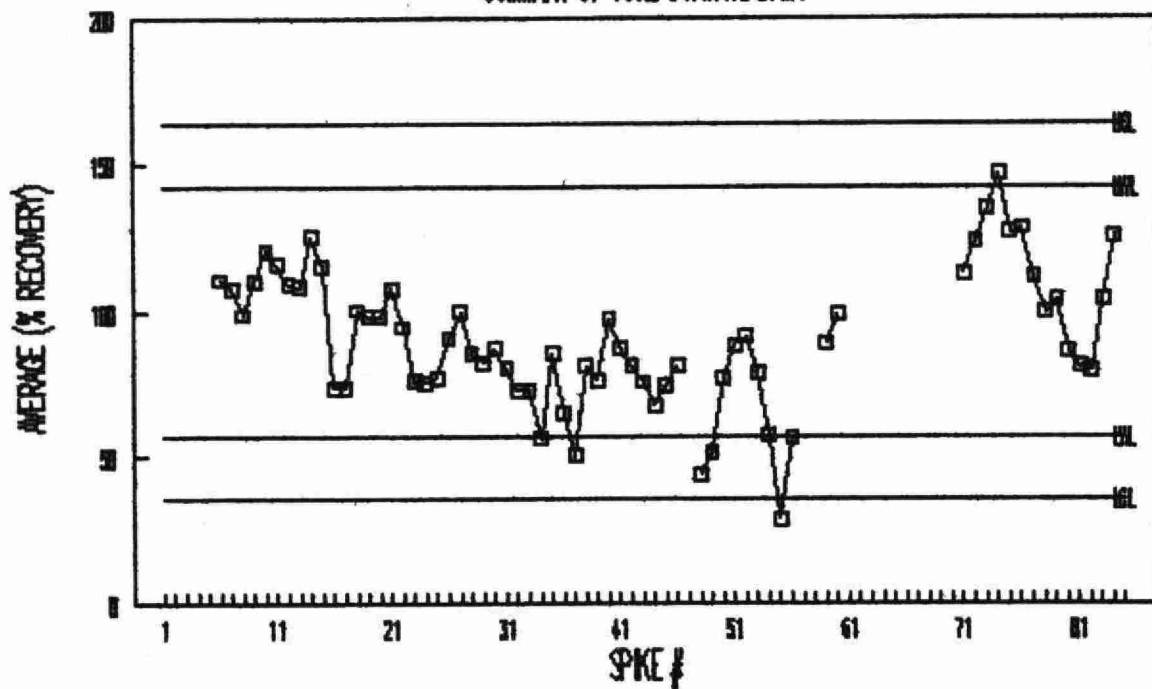
UNIT:	WASTEWATER	MATRIX:	WATER
WORKSTATION:	TOMBAN/TOMPAH	INSTRUMENT:	GC/MSA#1
TIME PERIOD:	JAN.-DEC.1992	NO. OBSERVATIONS:	84

YEARLY CALCULATIONS

PARAMETER COMPOUNND	CONCENTRATION UG/L	AVG. SPK. % REC.	STD. DEV. % REC.	% C.V.
63. PNBKF	: 0.95	: 107.51	: 31.06	: 28.89
64. PNBAP	: 1.01	: 100.44	: 28.90	: 28.77
65. PNPERY	: 1.01	: 99.27	: 27.15	: 27.35
66. PNINP	: 1.0	: 108.04	: 18.67	: 17.28
67. PNDAHS	: 1.0	: 103.10	: 19.57	: 18.98
68. PNGHIP	: 1.02	: 103.21	: 17.18	: 16.65
69. D10-ANT	: 1.10	: 47.08	: 45.23	: 96.06
70. D12-CHR	: 1.0	: 108.96	: 28.07	: 25.76
71.D12-GHI	: 1.0	: 16.68	: 19.99	: 119.85

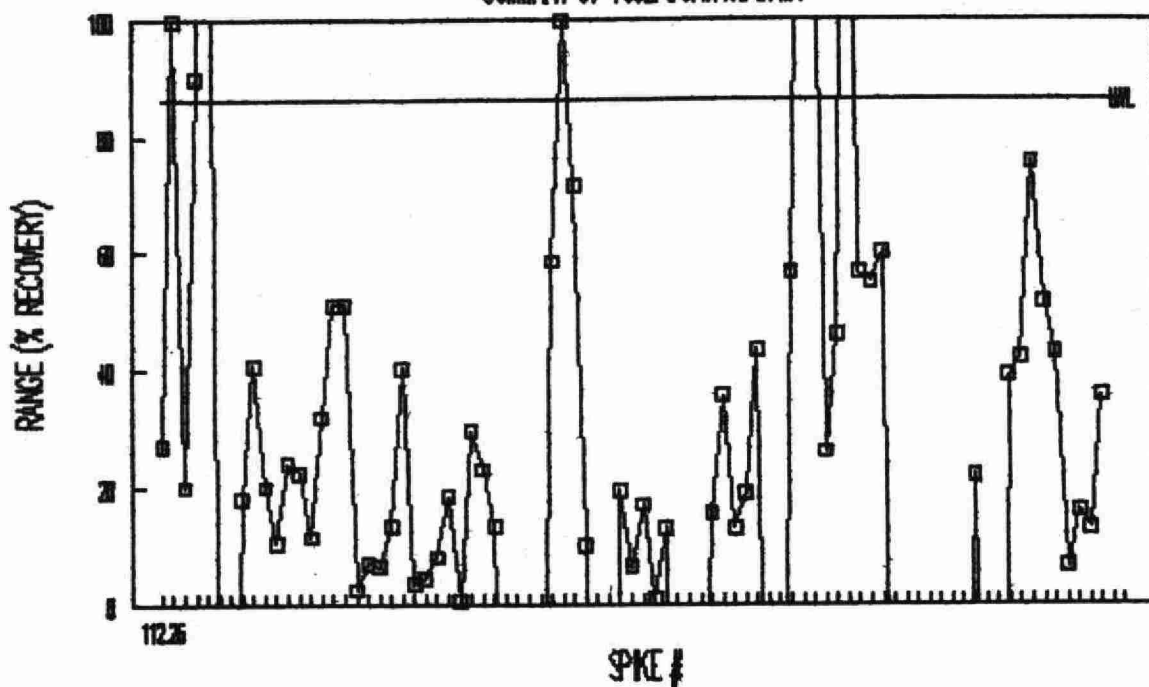
MISA19/20:PM CAMP

SUMMARY OF 1992 CONTROL DATA



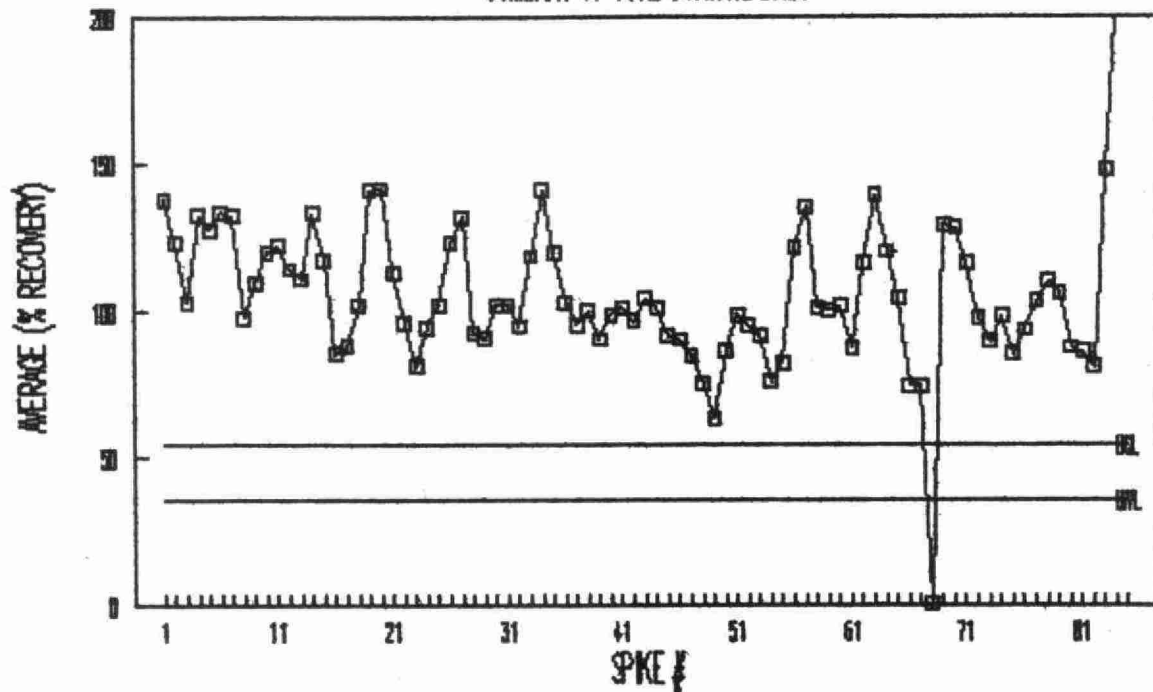
MISA19/20:PM CAMP

SUMMARY OF 1992 CONTROL DATA



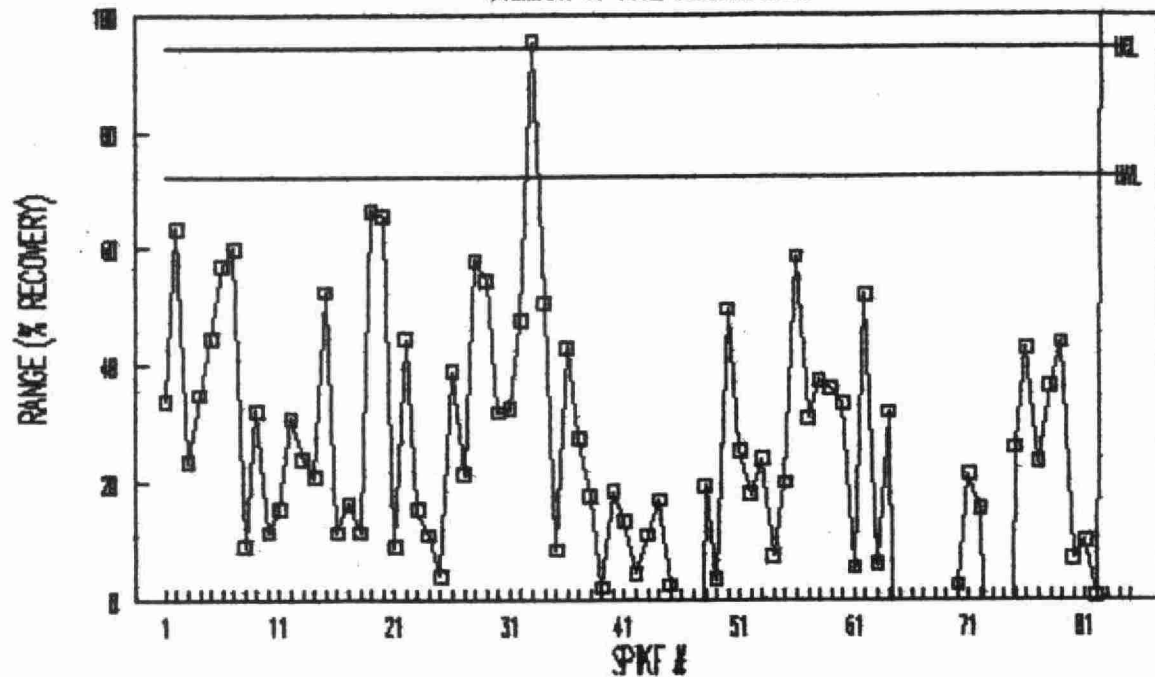
MISA19/20:PMB2EE

SUMMARY OF 1992 CONTROL DATA



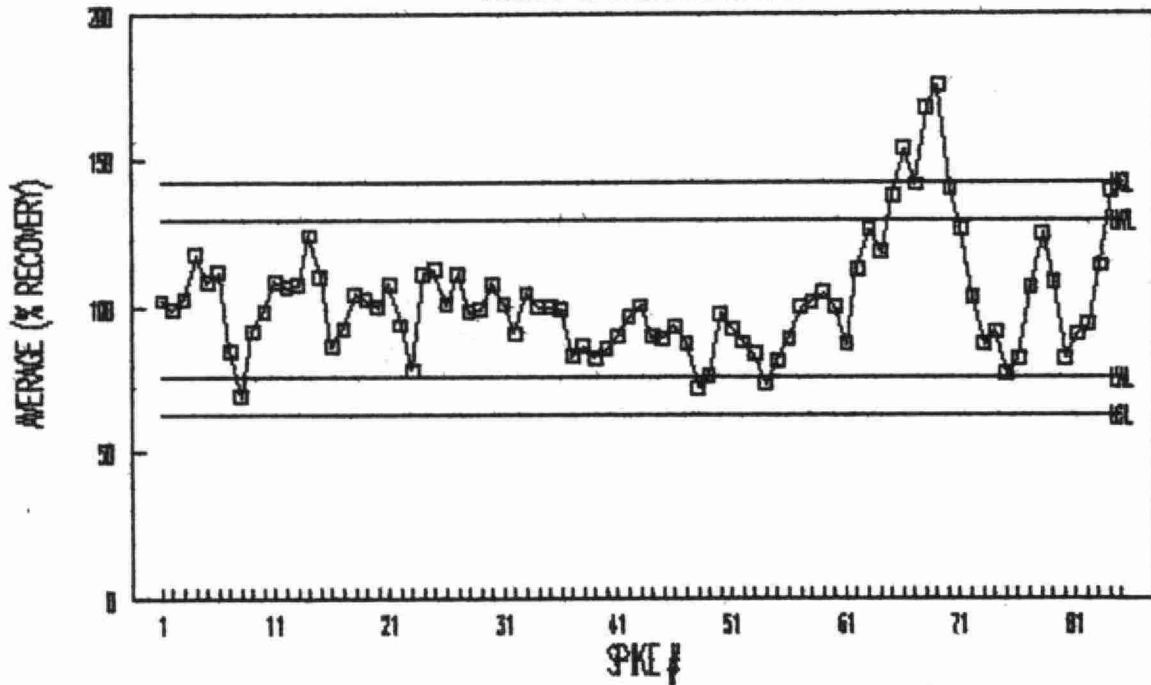
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SUMMARY OF 1992 CONTROL DATA



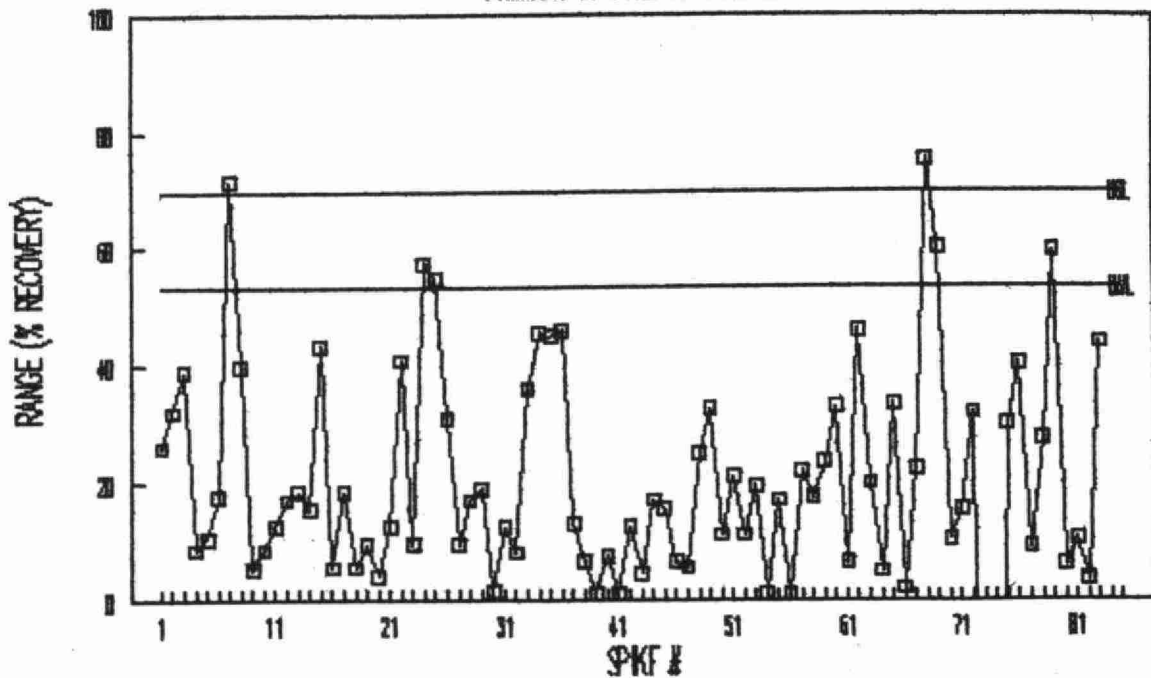
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SUMMARY OF 1992 CONTROL DATA



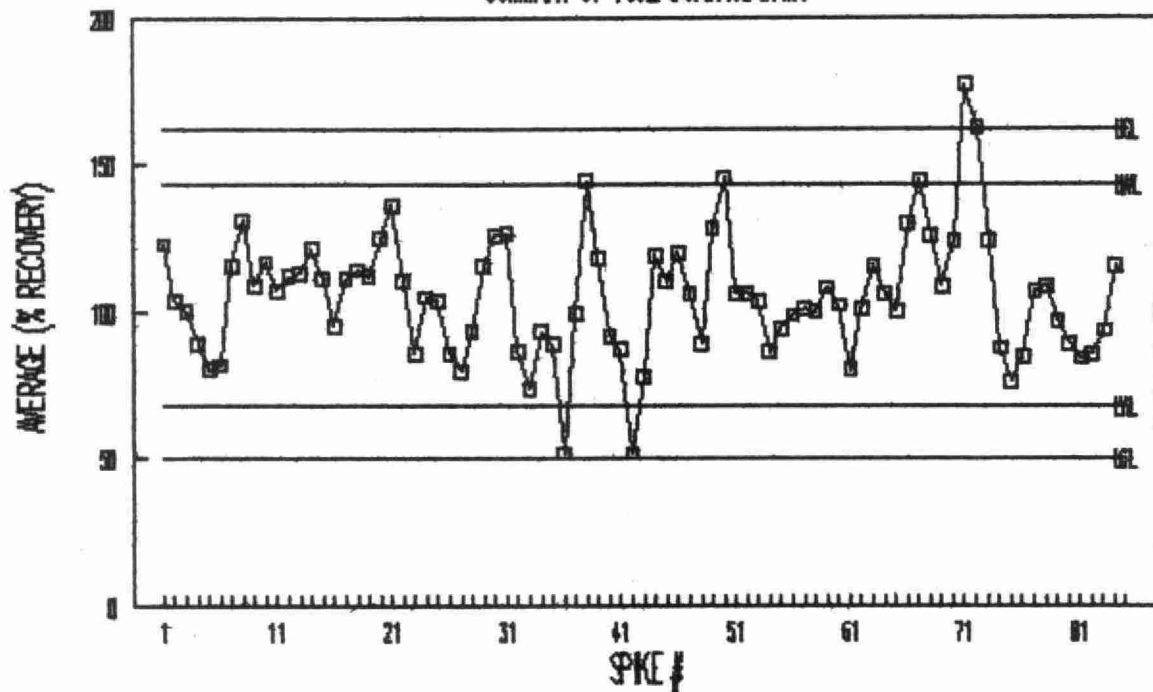
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SUMMARY OF 1992 CONTROL DATA



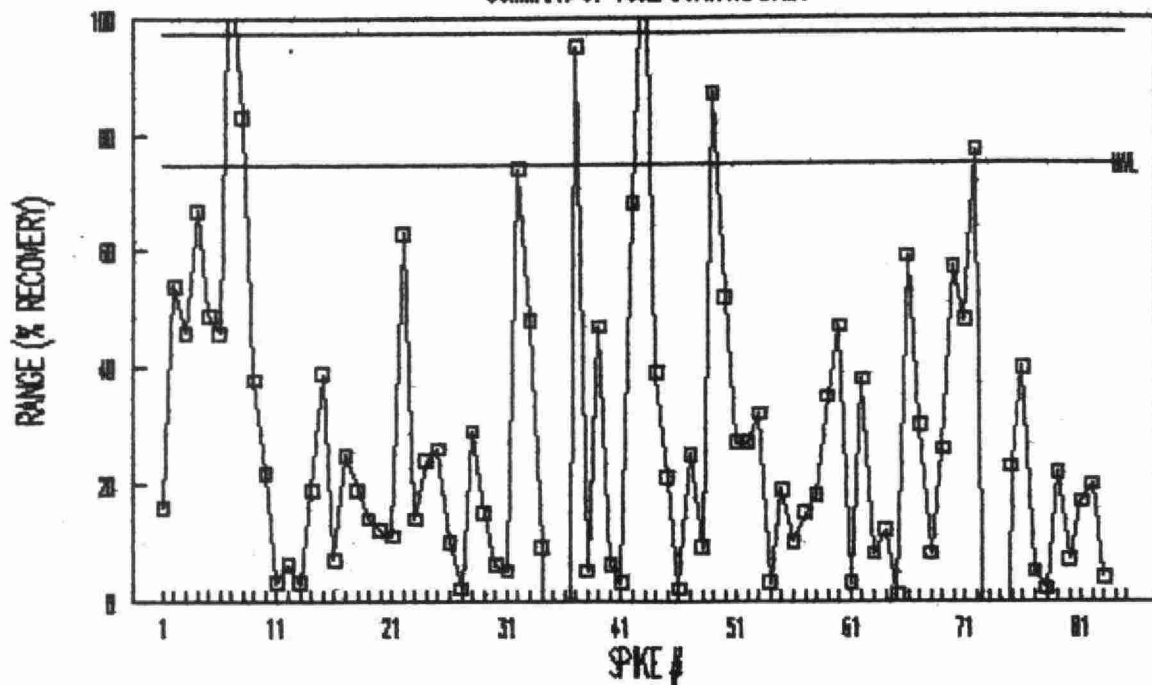
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SUMMARY OF 1992 CONTROL DATA



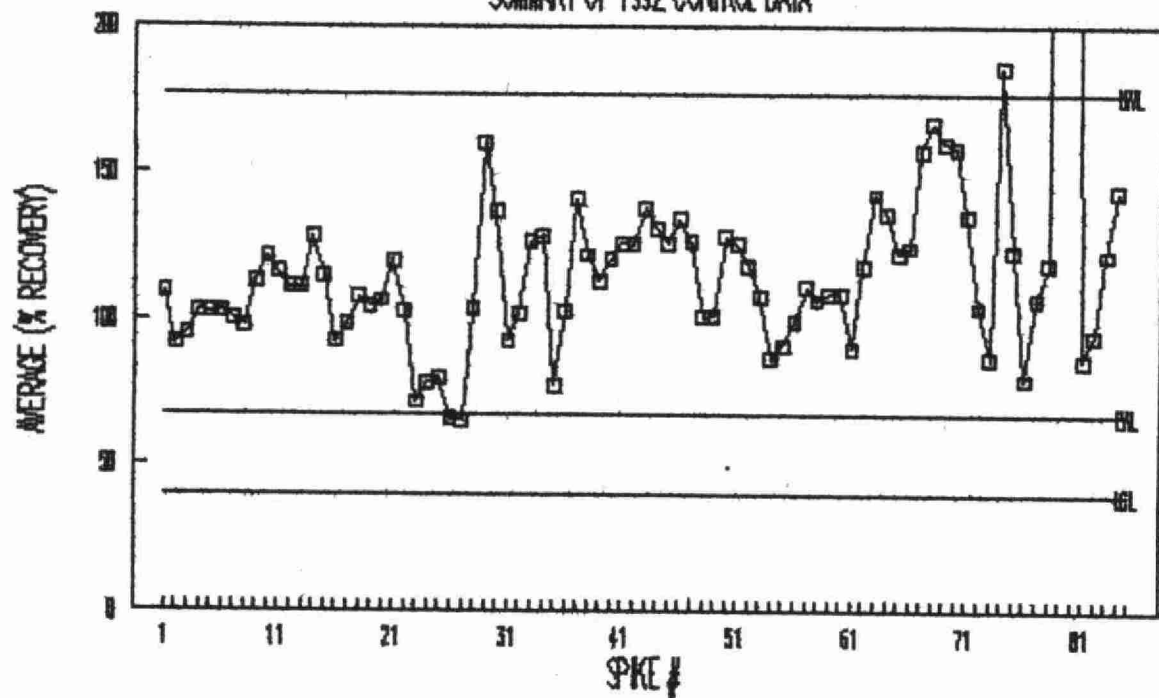
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SUMMARY OF 1992 CONTROL DATA



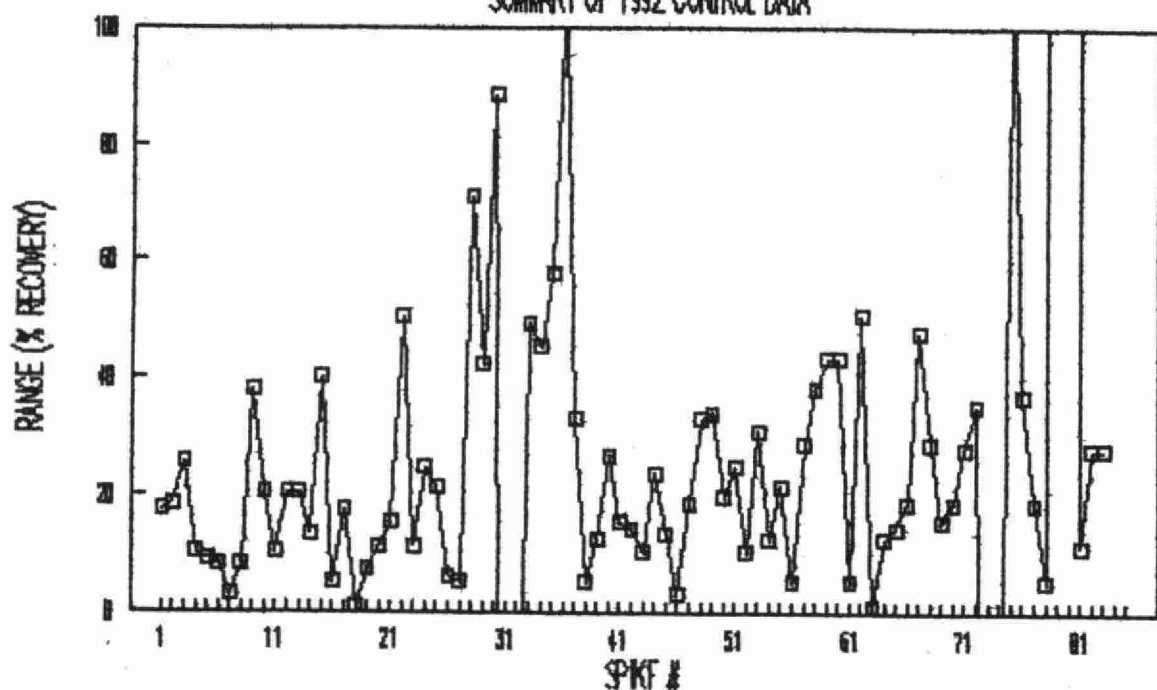
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SUMMARY OF 1992 CONTROL DATA



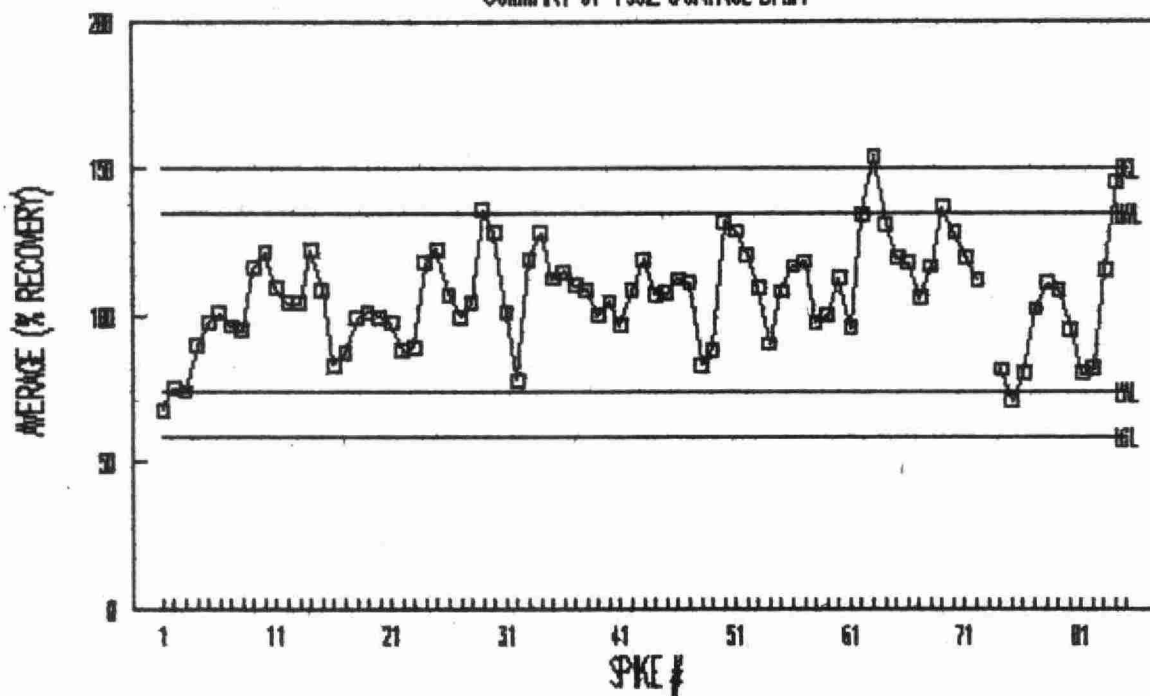
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SUMMARY OF 1992 CONTROL DATA



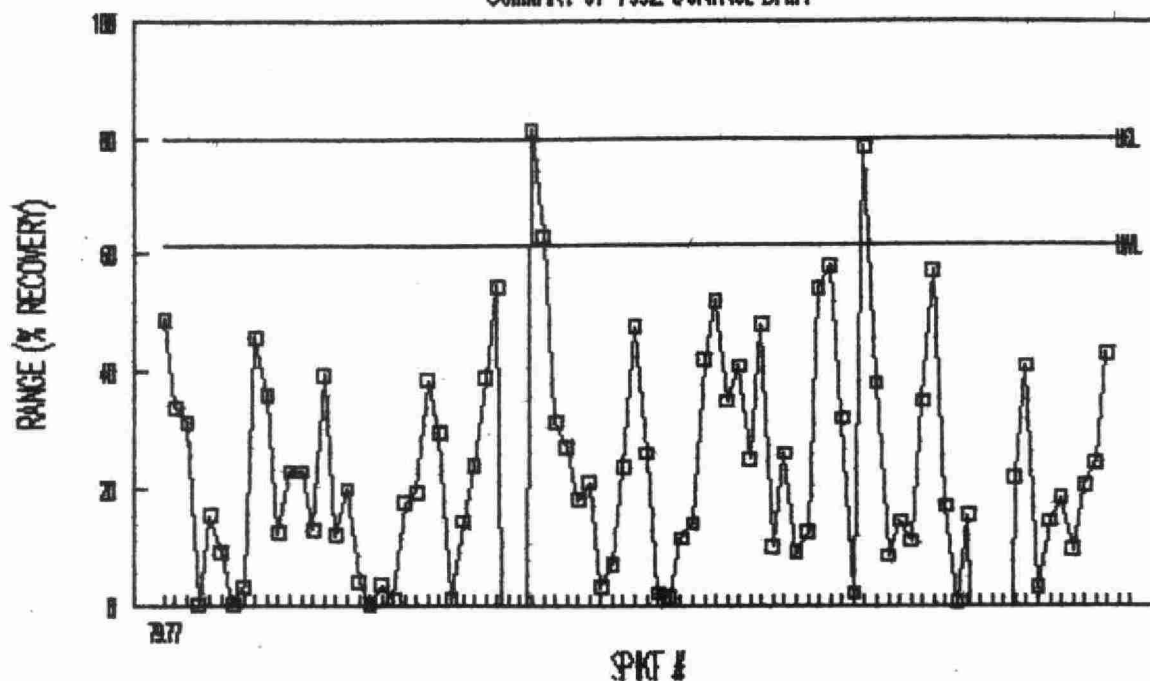
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SUMMARY OF 1992 CONTROL DATA



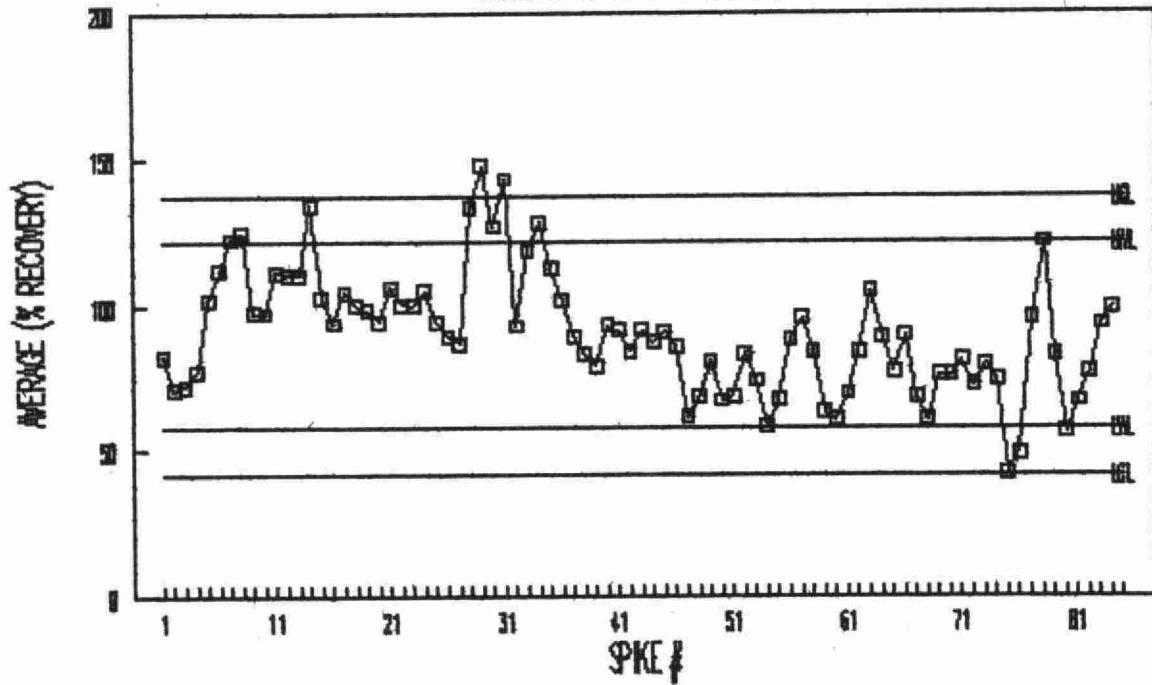
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SUMMARY OF 1992 CONTROL DATA



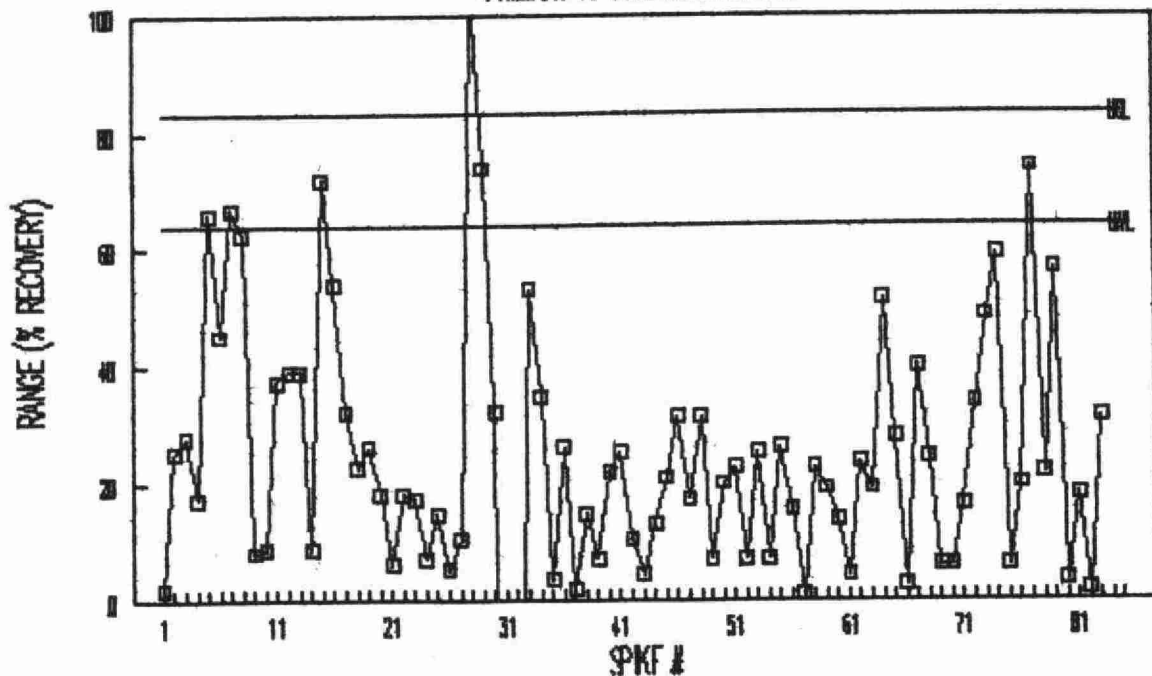
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SUMMARY OF 1992 CONTROL DATA



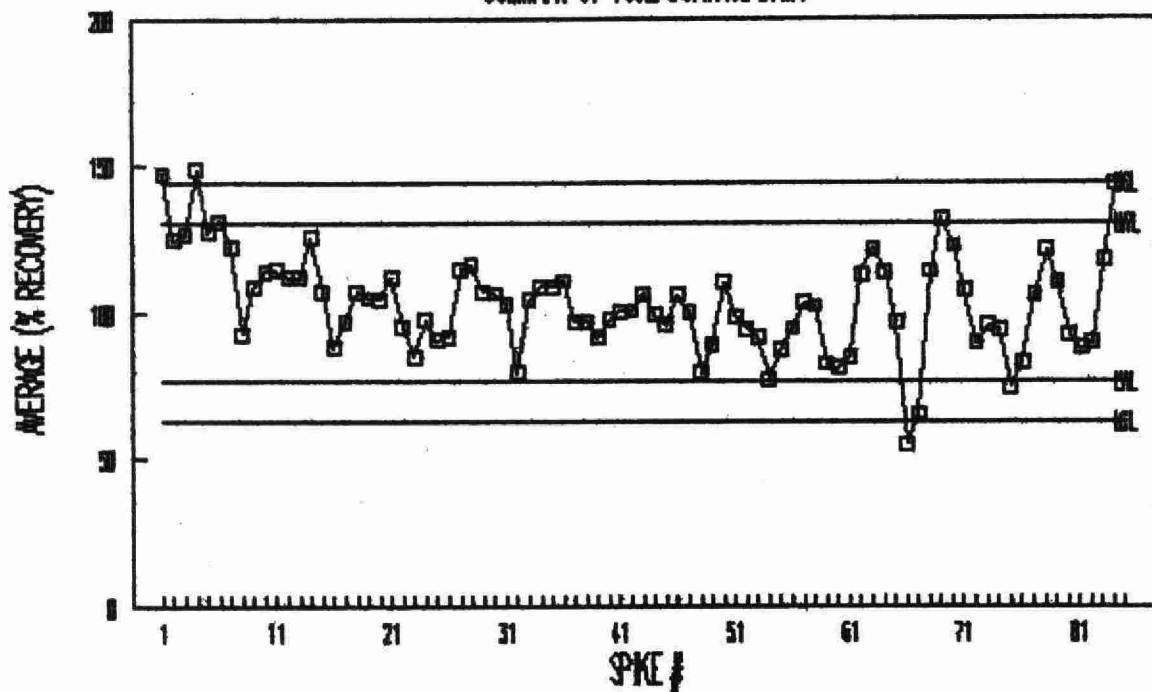
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SUMMARY OF 1992 CONTROL DATA



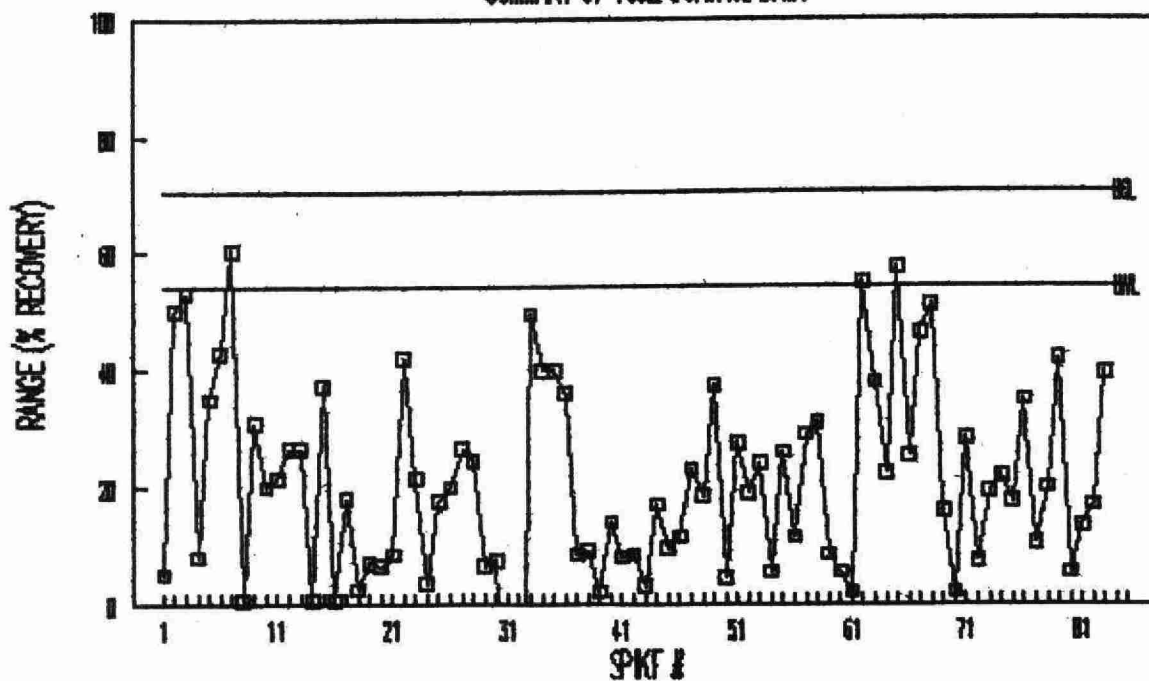
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SUMMARY OF 1992 CONTROL DATA



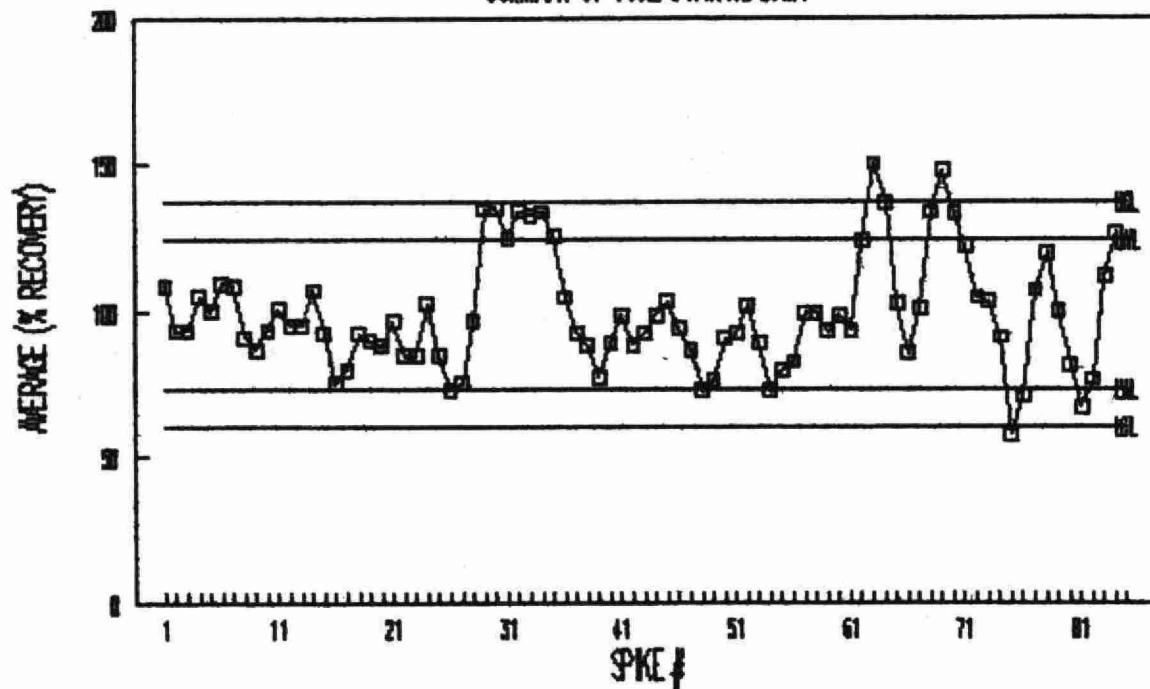
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SUMMARY OF 1992 CONTROL DATA



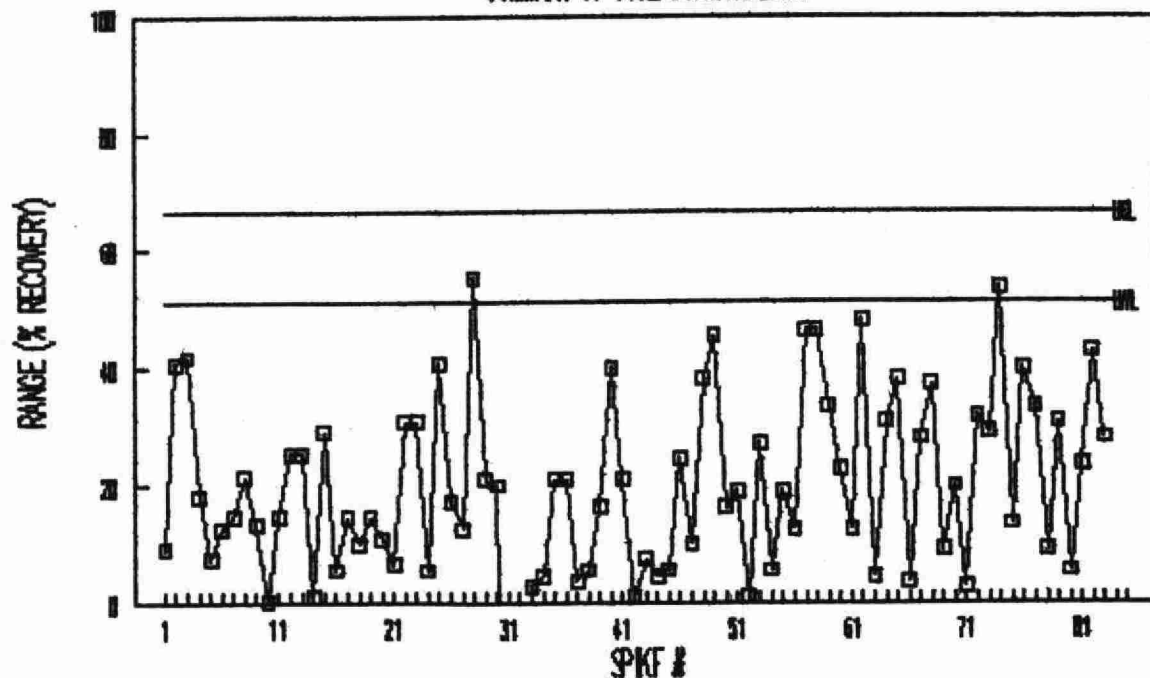
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SUMMARY OF 1992 CONTROL DATA



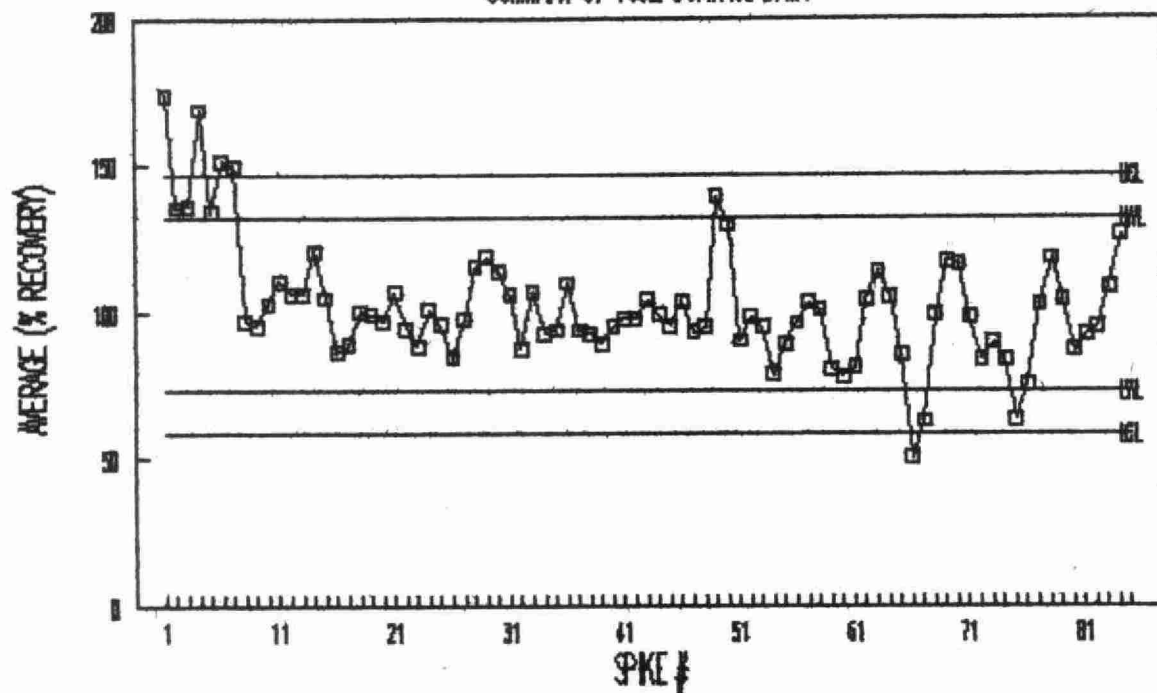
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SUMMARY OF 1992 CONTROL DATA



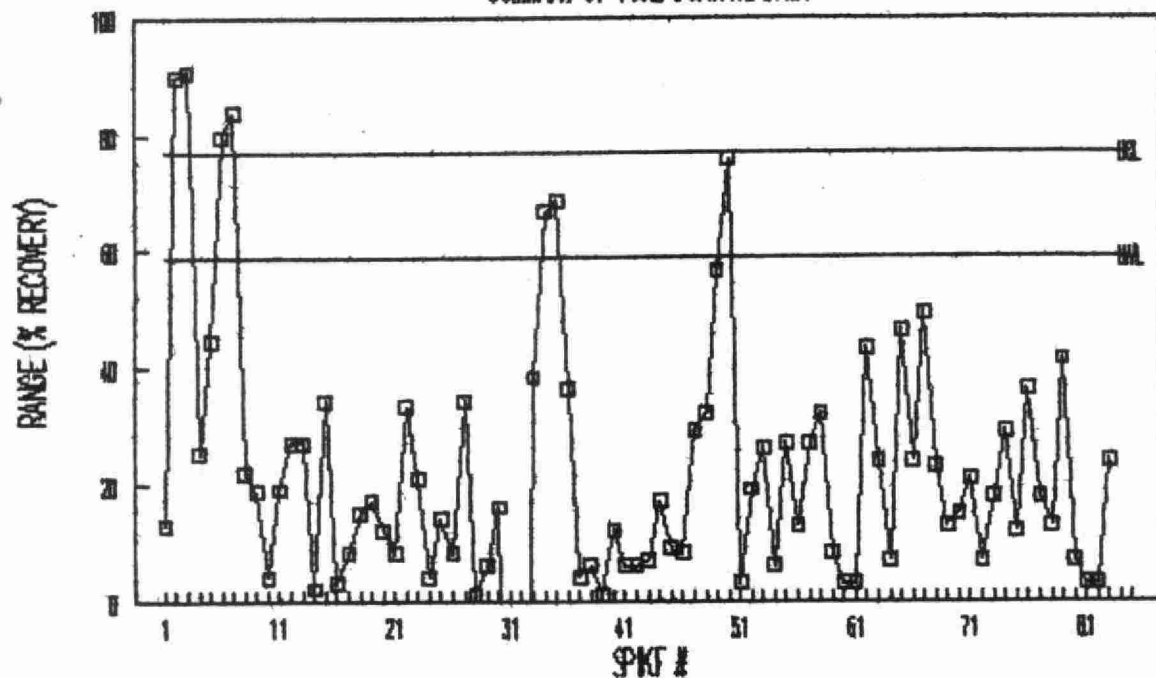
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SUMMARY OF 1992 CONTROL DATA



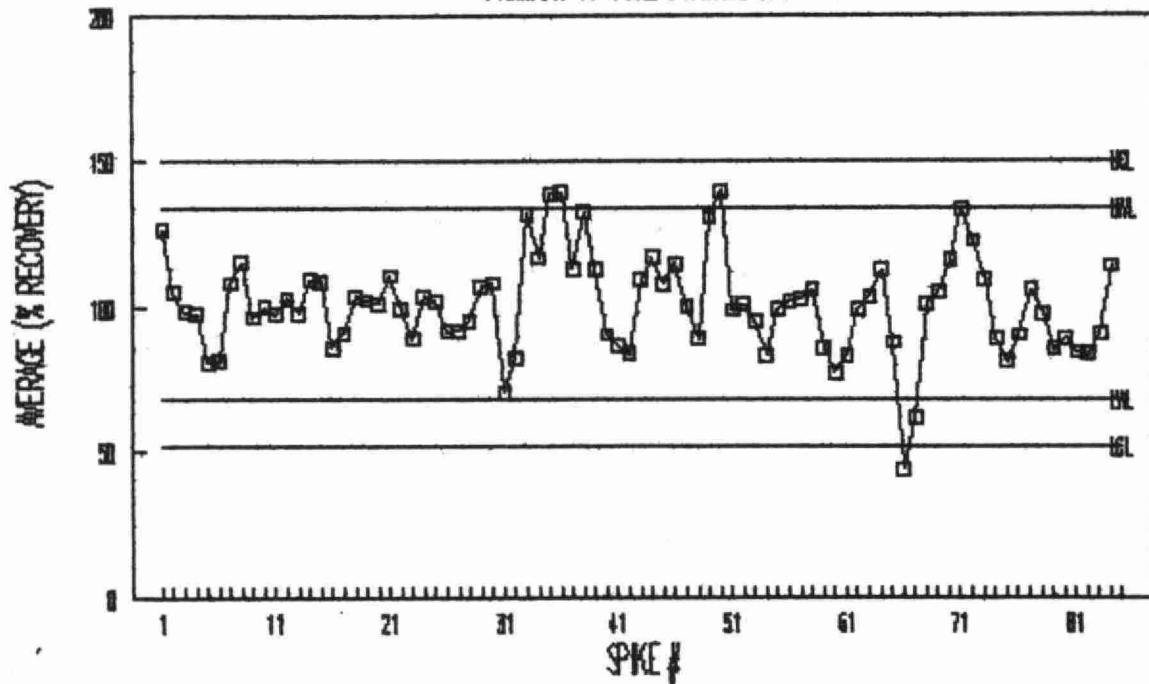
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SUMMARY OF 1992 CONTROL DATA



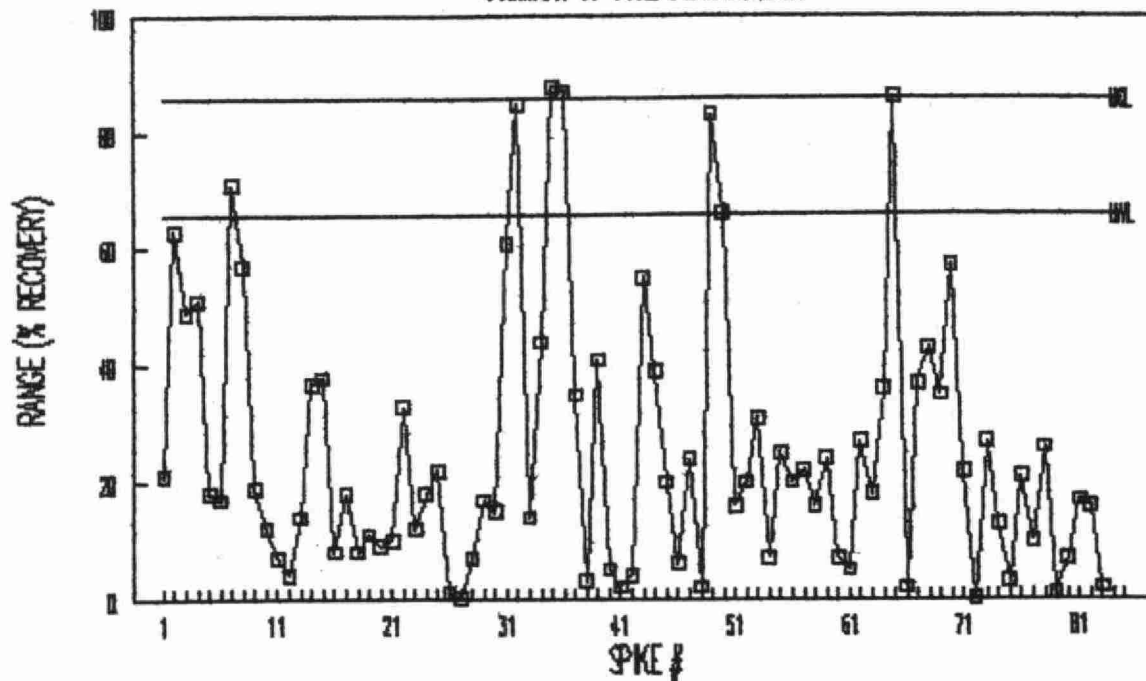
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SUMMARY OF 1992 CONTROL DATA



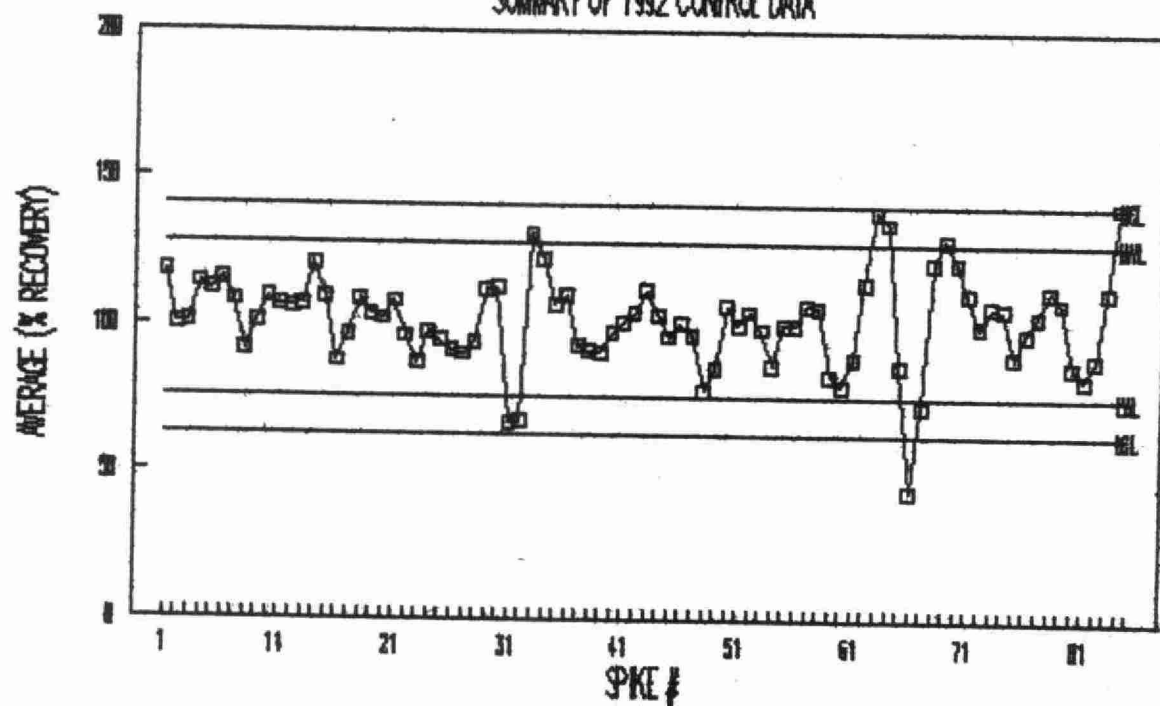
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SUMMARY OF 1992 CONTROL DATA



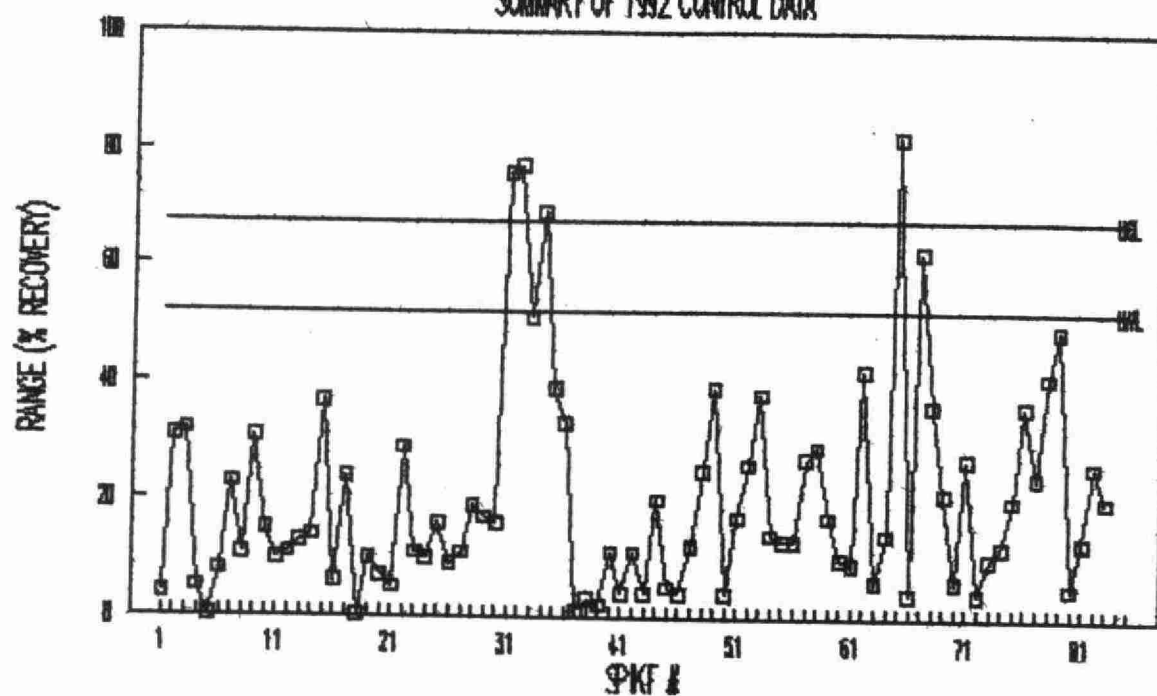
MISA19/20:PNNAPH

SUMMARY OF 1992 CONTROL DATA



MISA19/20:PNNAPH

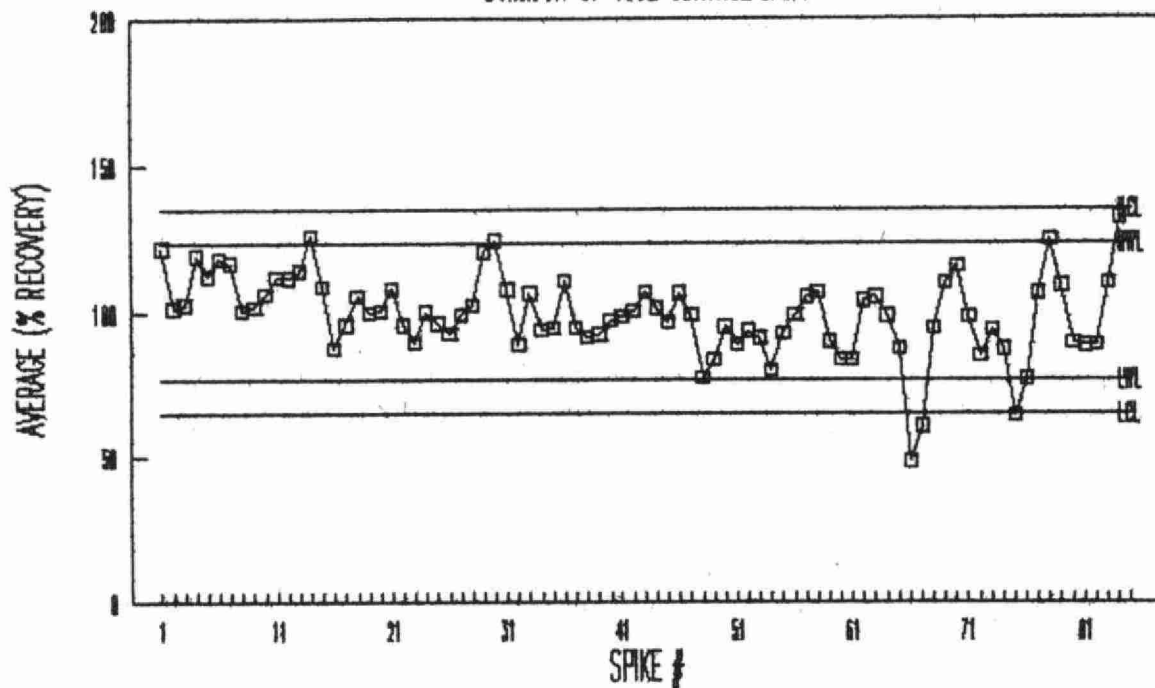
SUMMARY OF 1992 CONTROL DATA



13

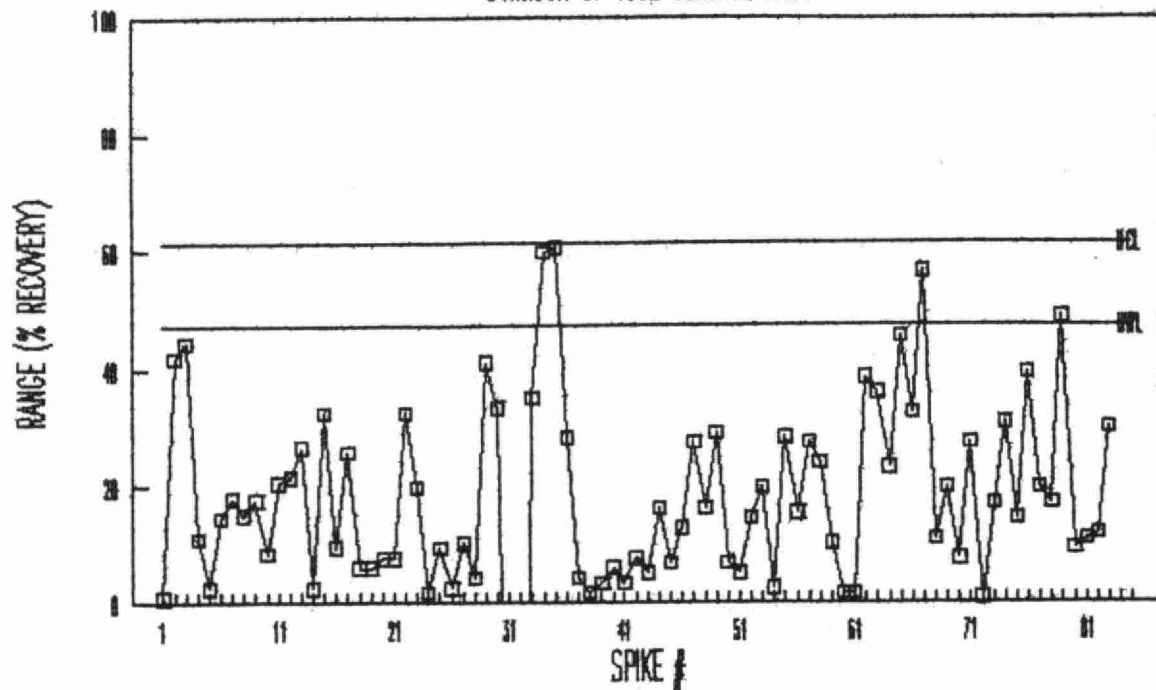
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SUMMARY OF 1992 CONTROL DATA



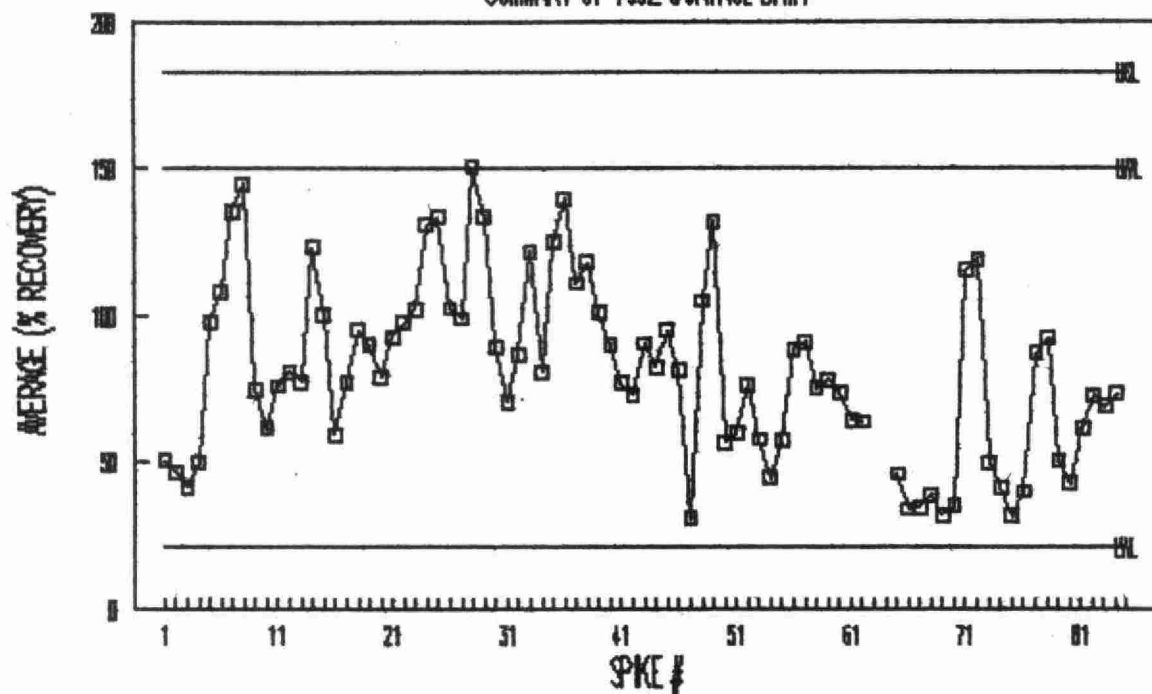
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SUMMARY OF 1992 CONTROL DATA



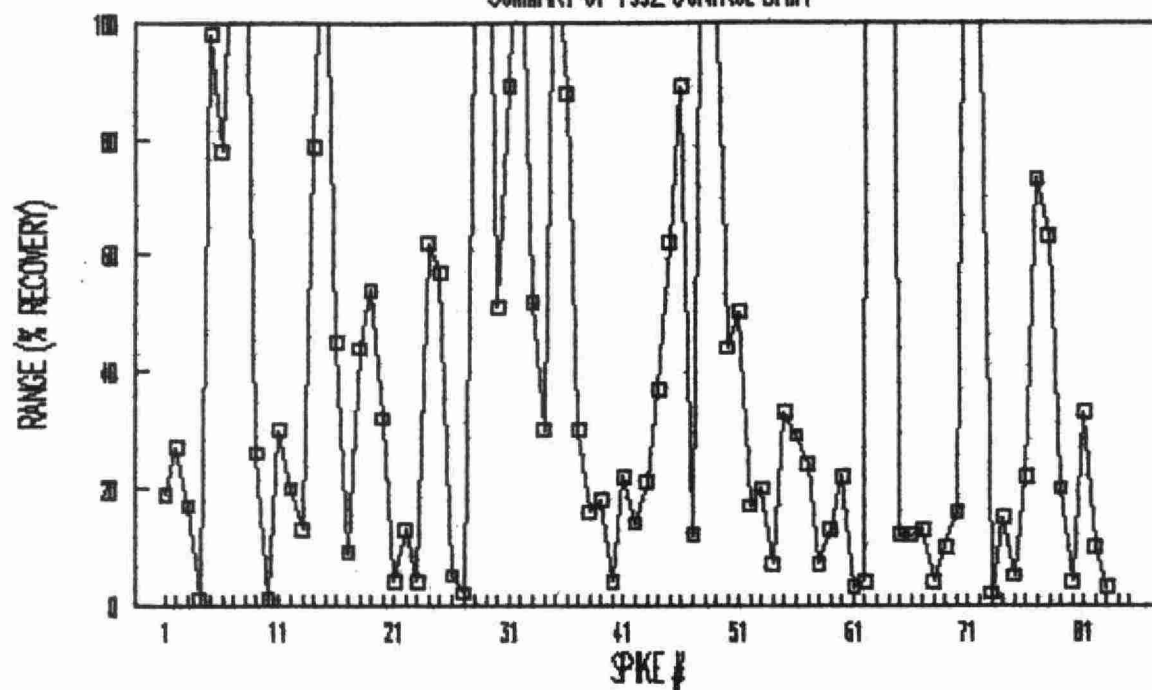
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SUMMARY OF 1992 CONTROL DATA



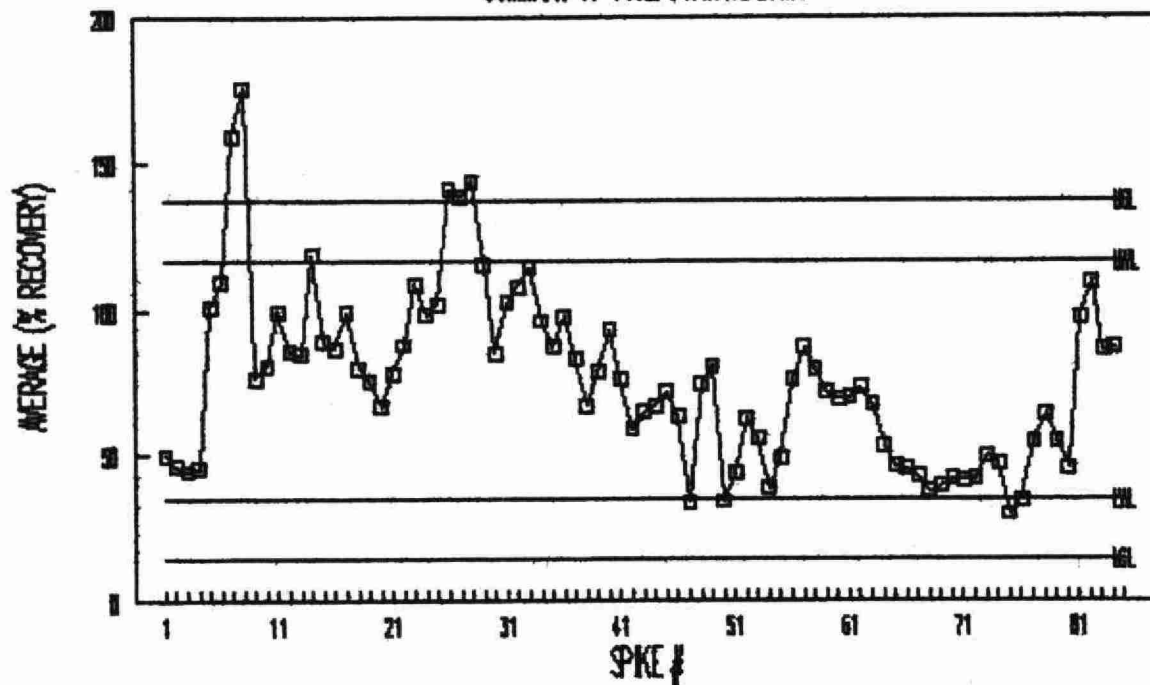
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SUMMARY OF 1992 CONTROL DATA



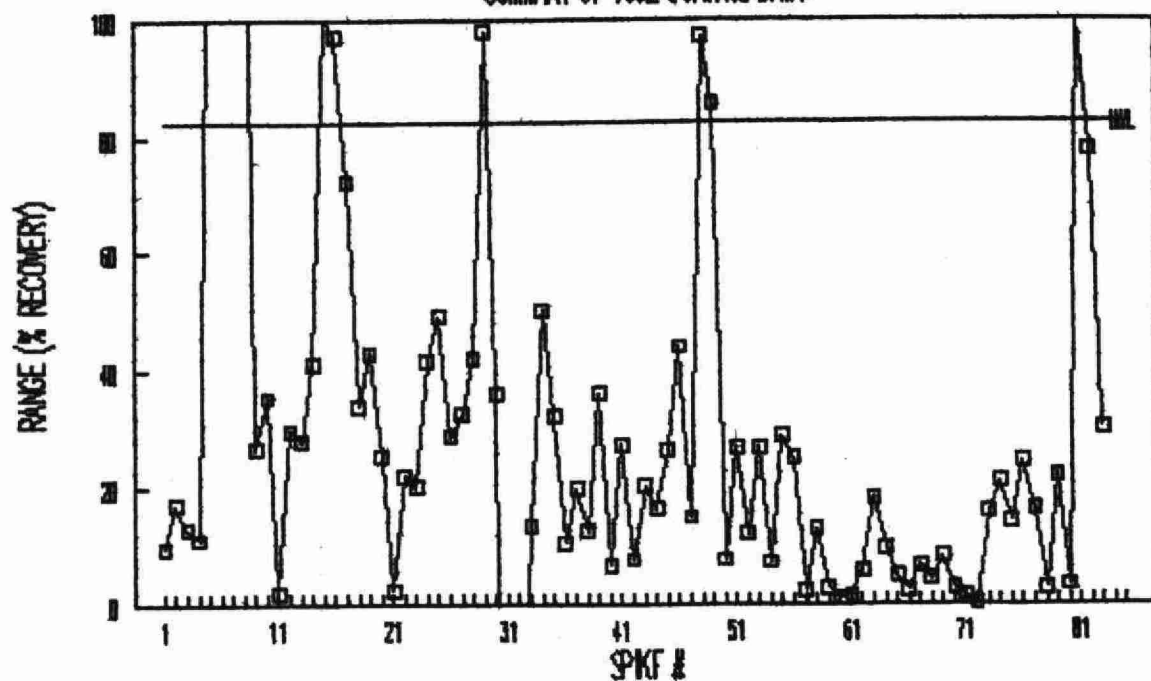
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SUMMARY OF 1992 CONTROL DATA



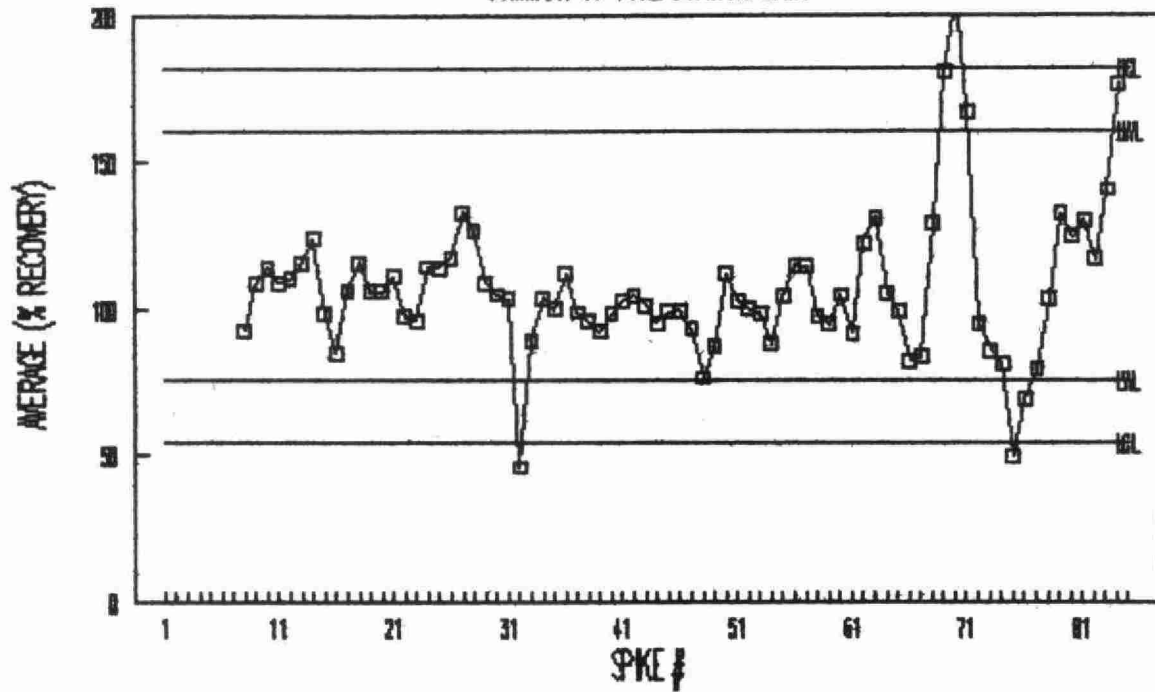
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SUMMARY OF 1992 CONTROL DATA



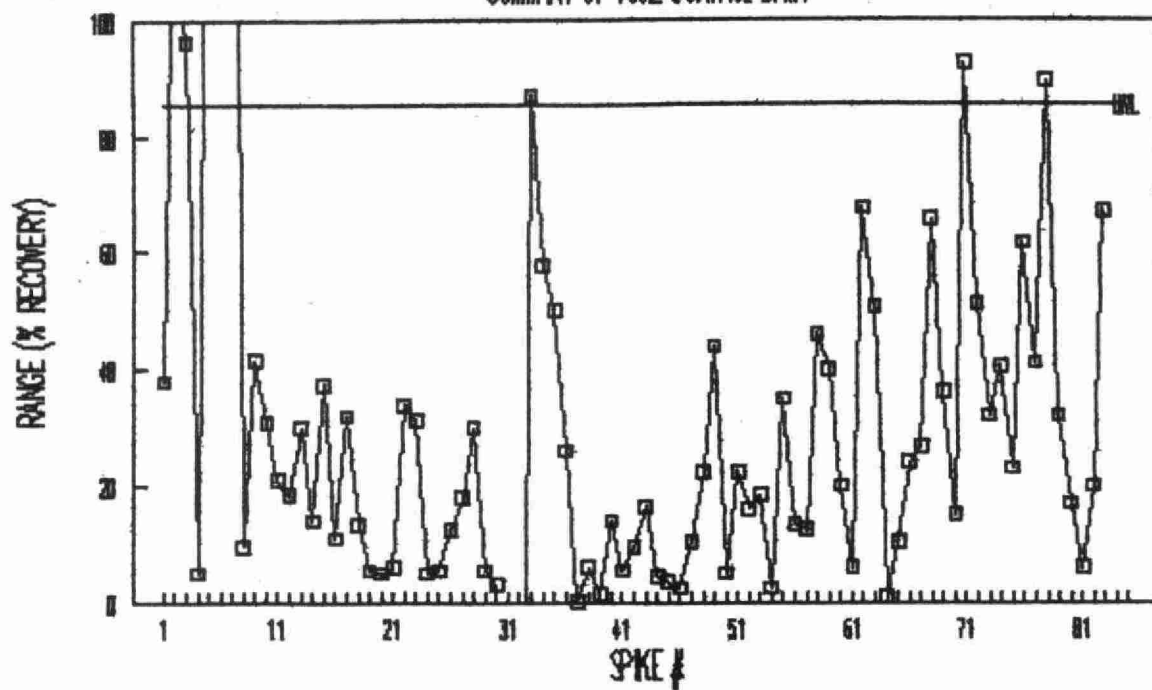
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SUMMARY OF 1992 CONTROL DATA



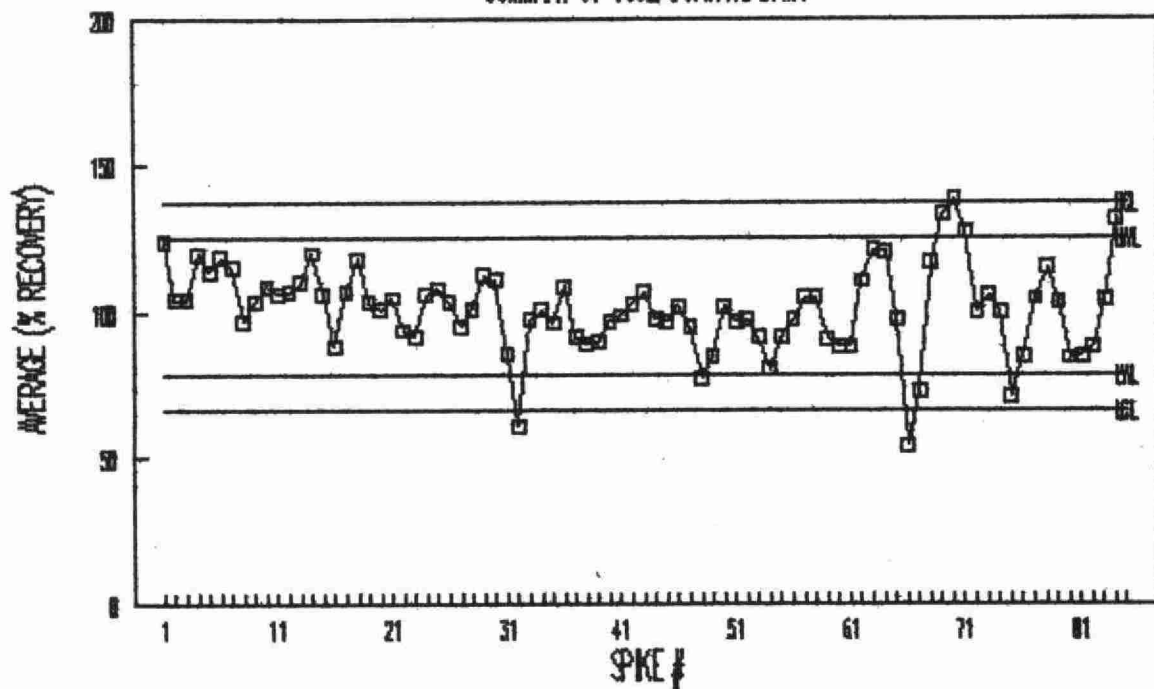
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SUMMARY OF 1992 CONTROL DATA



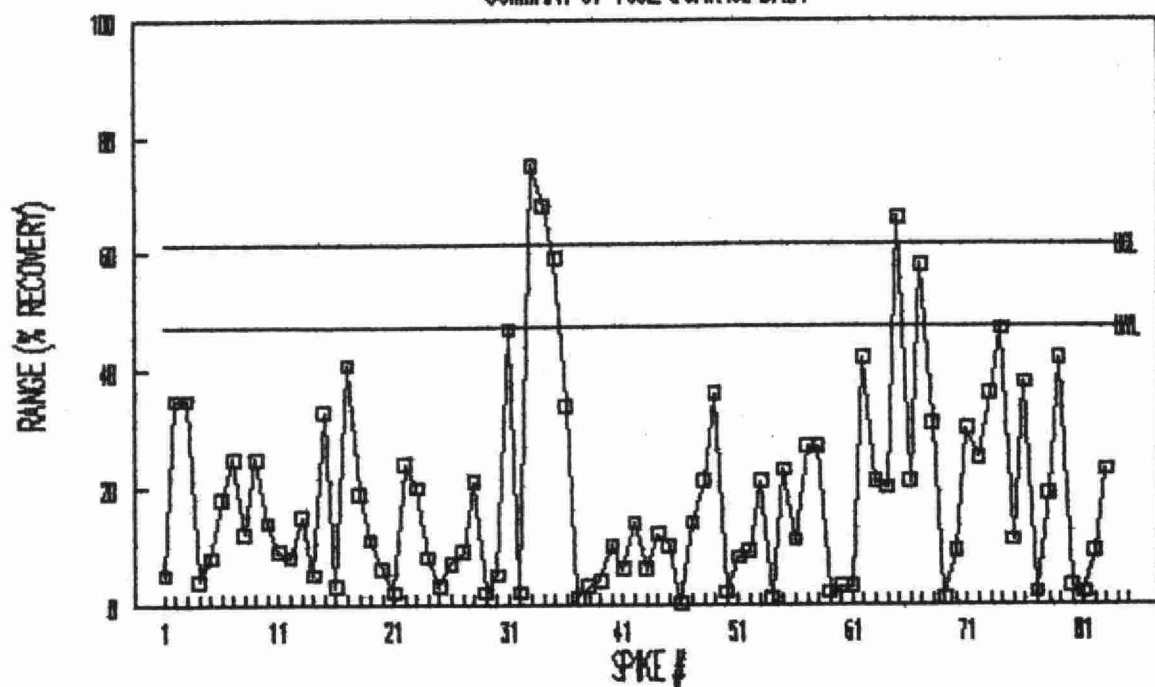
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SUMMARY OF 1992 CONTROL DATA



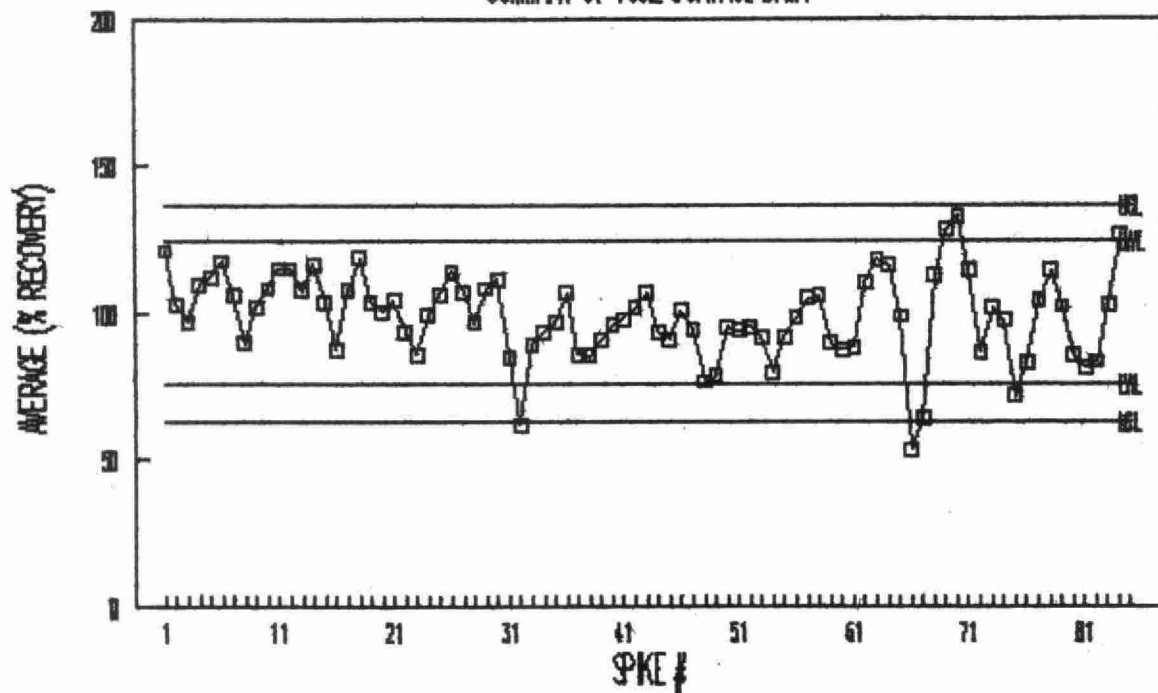
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SUMMARY OF 1992 CONTROL DATA



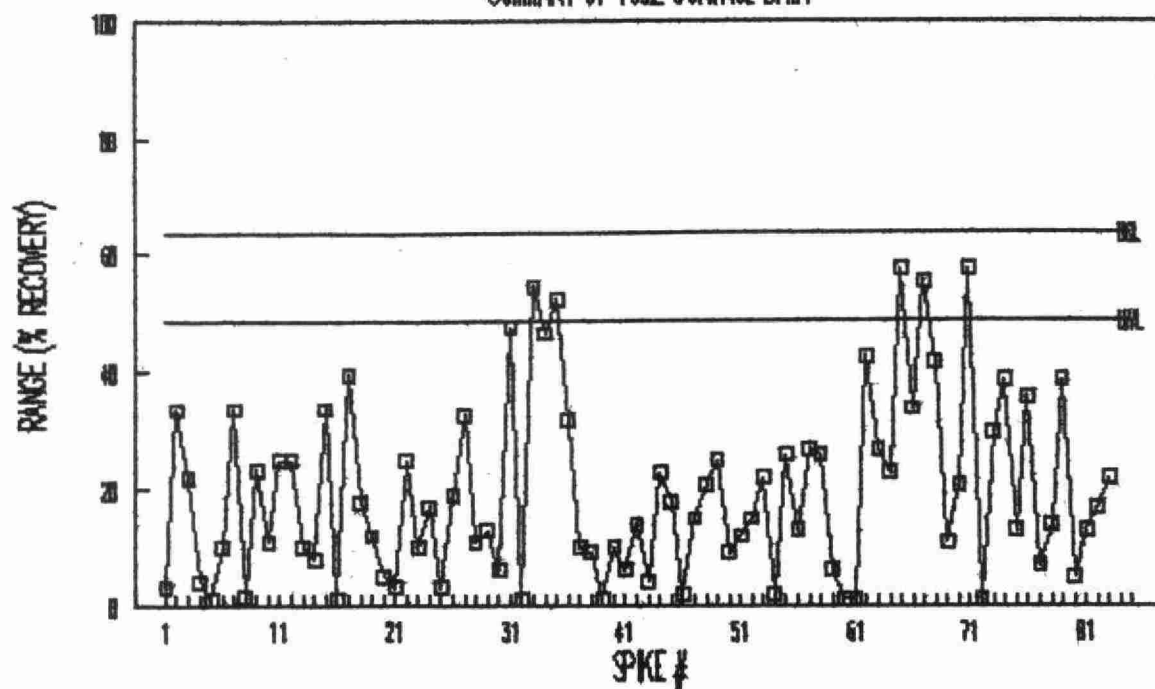
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SUMMARY OF 1992 CONTROL DATA



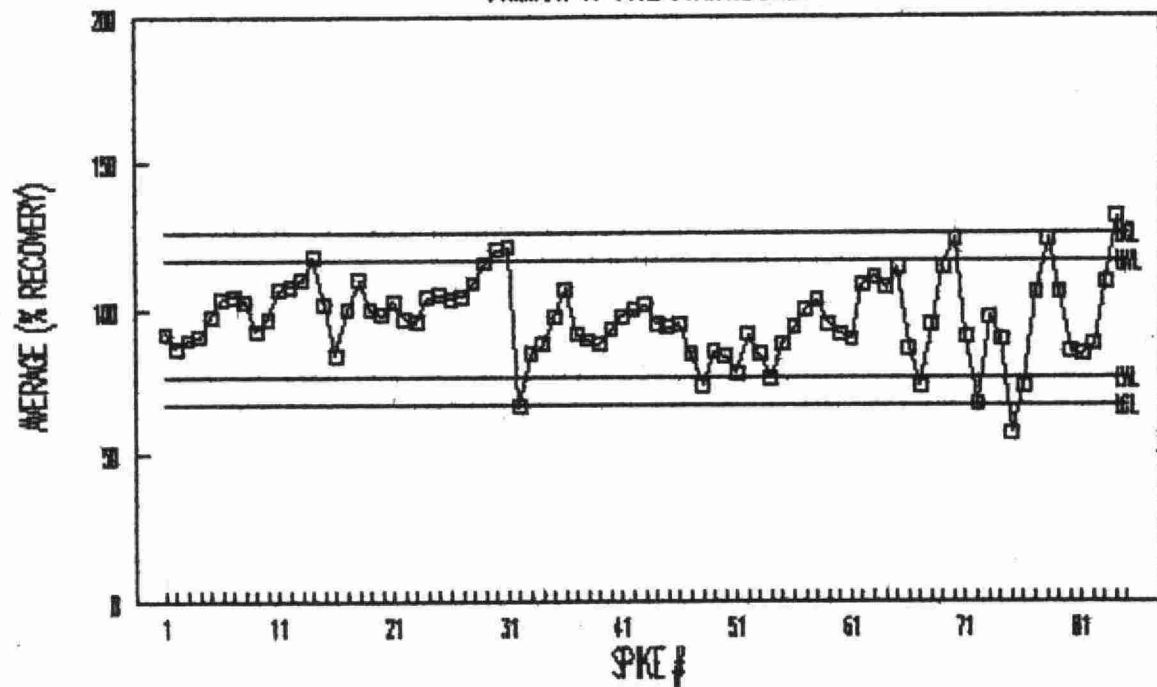
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SUMMARY OF 1992 CONTROL DATA



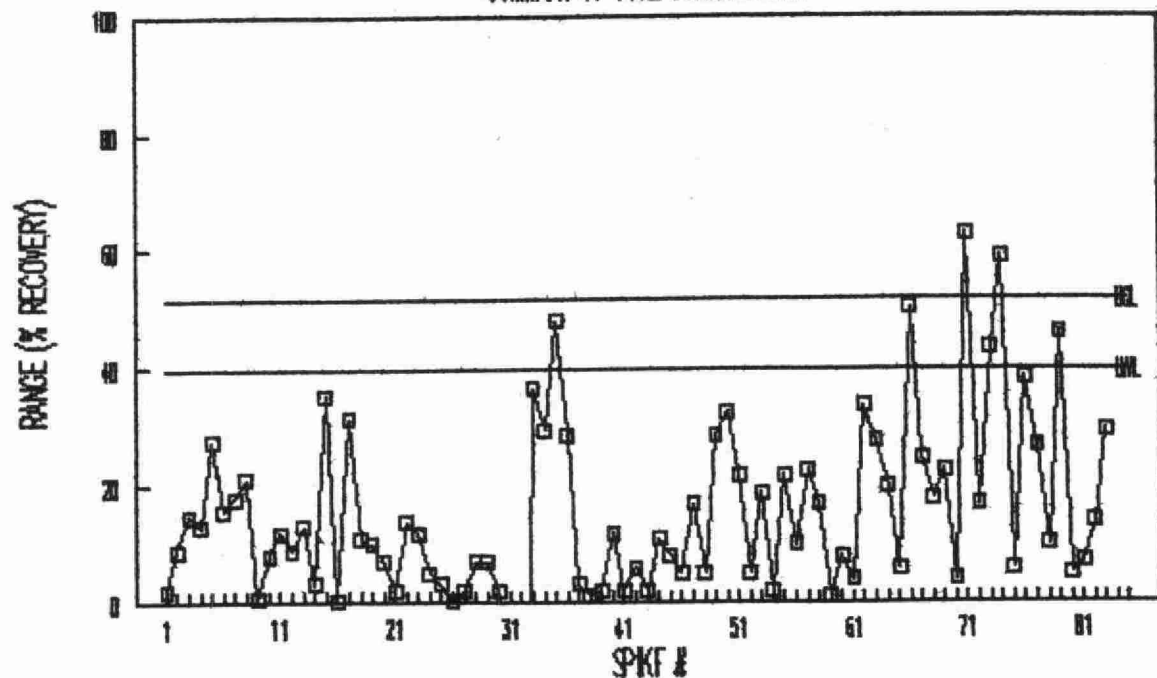
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SUMMARY OF 1992 CONTROL DATA



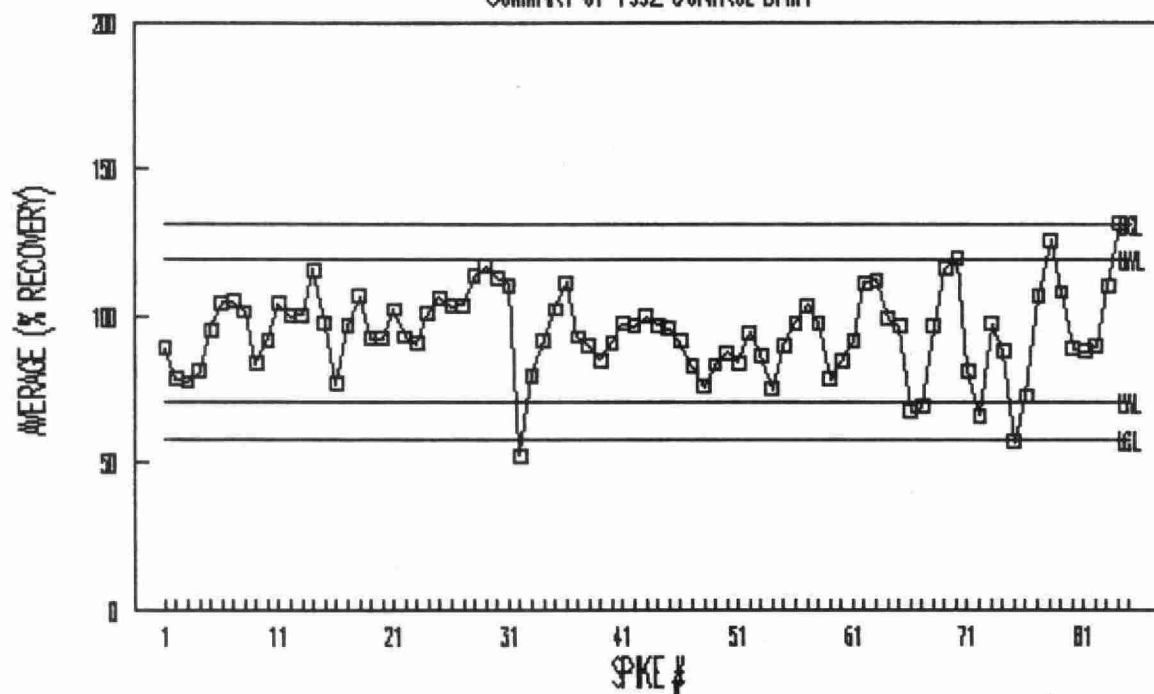
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SUMMARY OF 1992 CONTROL DATA



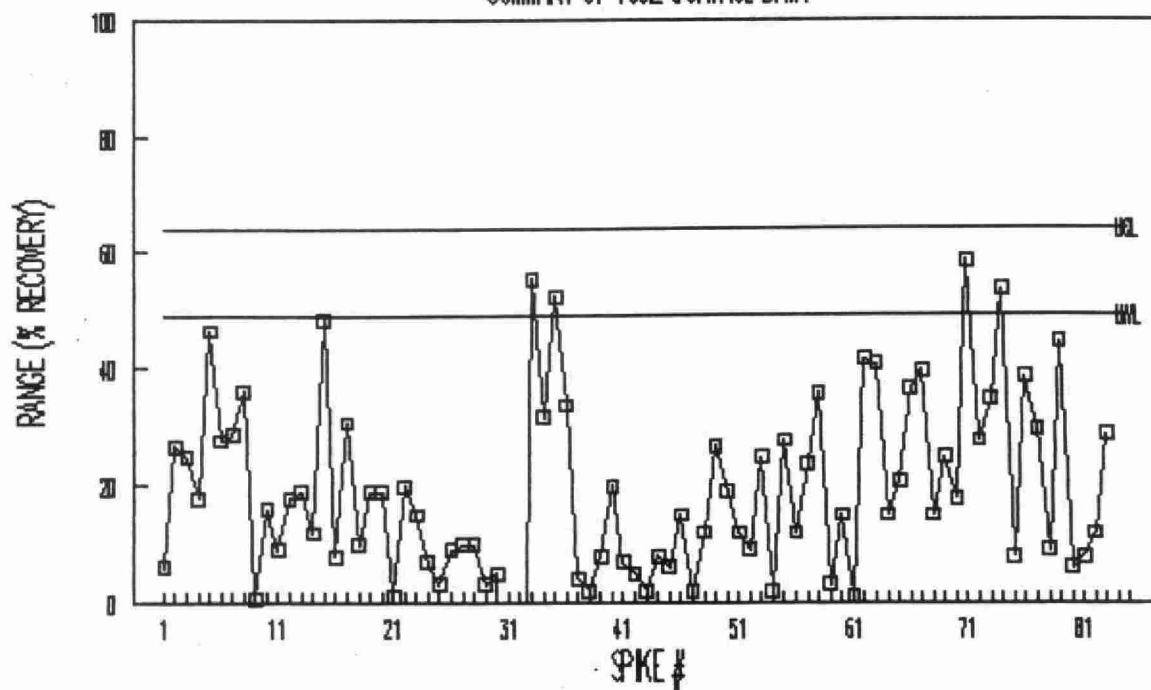
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SUMMARY OF 1992 CONTROL DATA



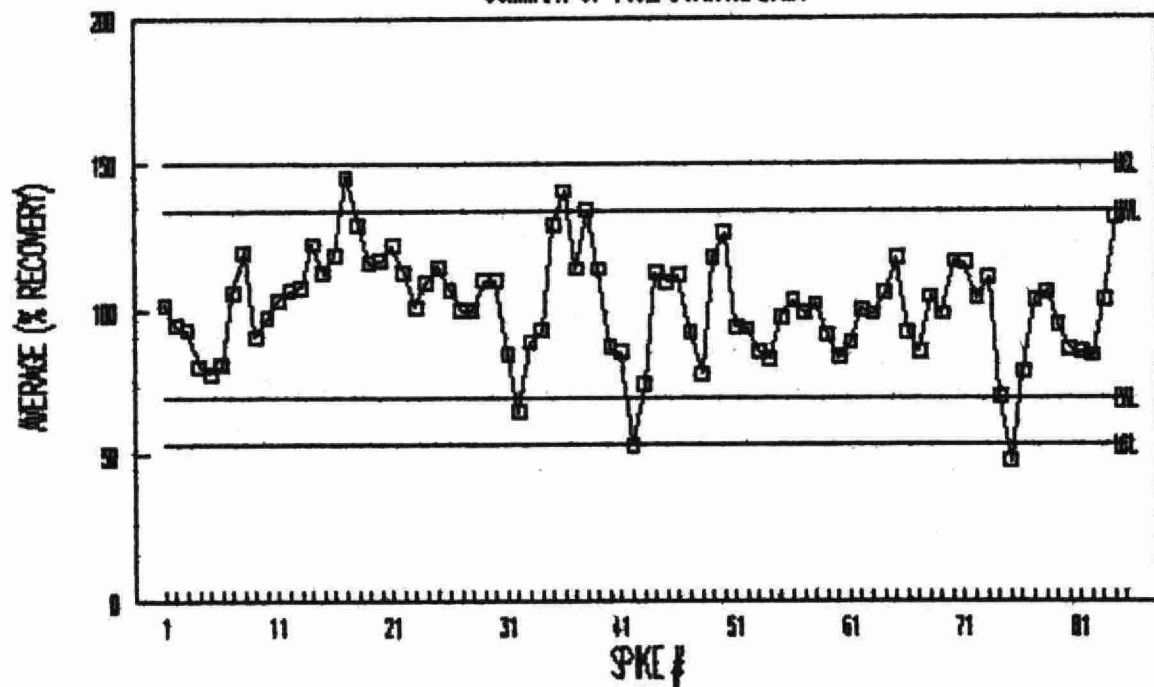
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SUMMARY OF 1992 CONTROL DATA



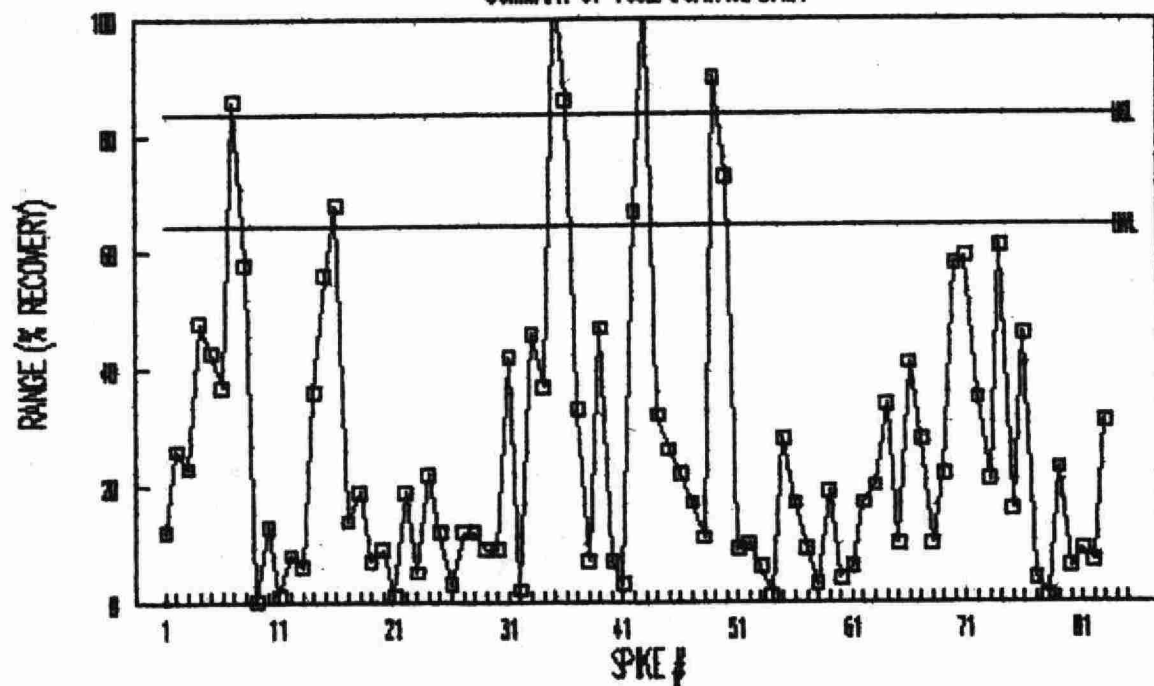
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SUMMARY OF 1992 CONTROL DATA



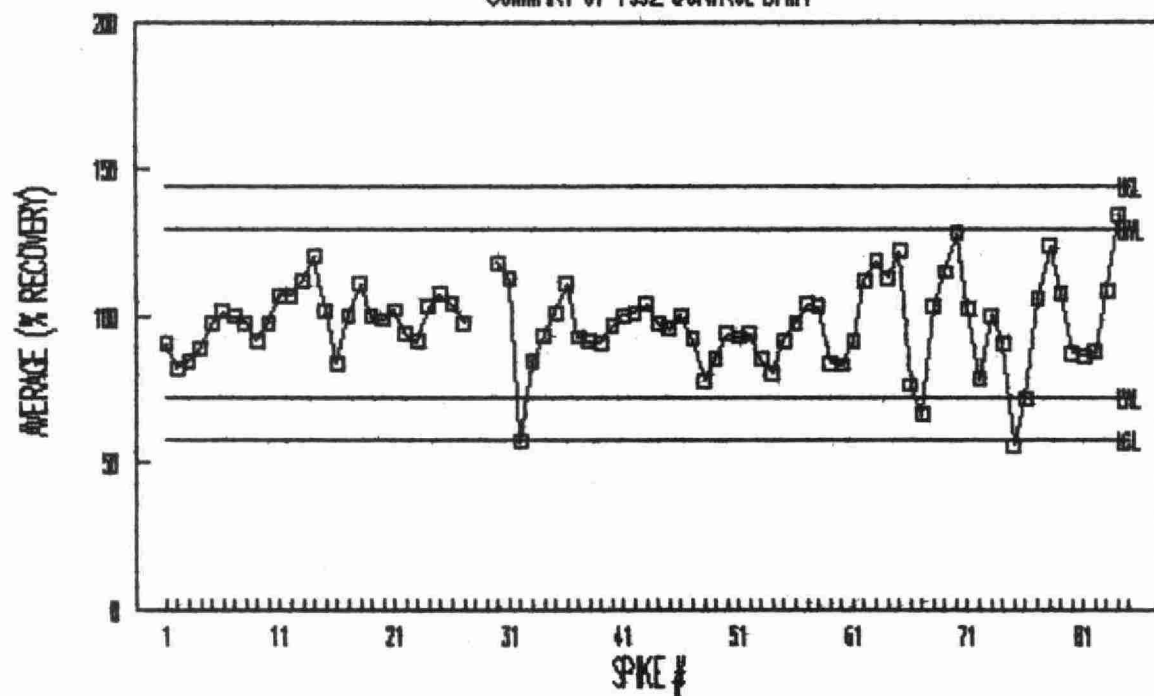
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SUMMARY OF 1992 CONTROL DATA



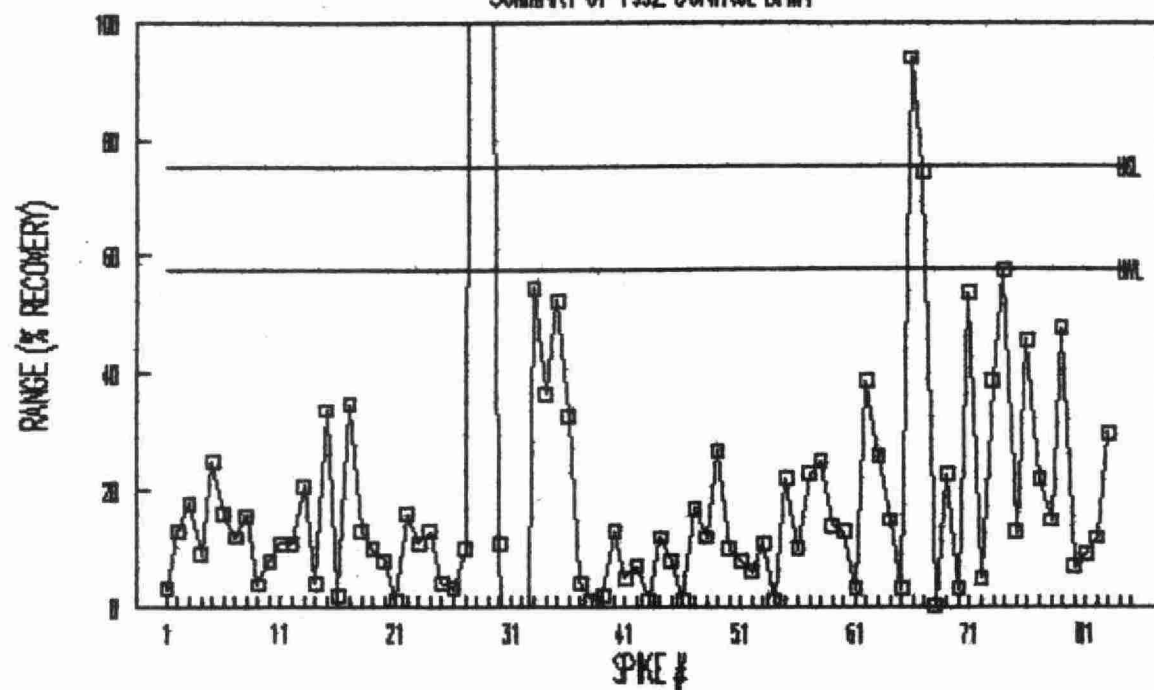
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SUMMARY OF 1992 CONTROL DATA



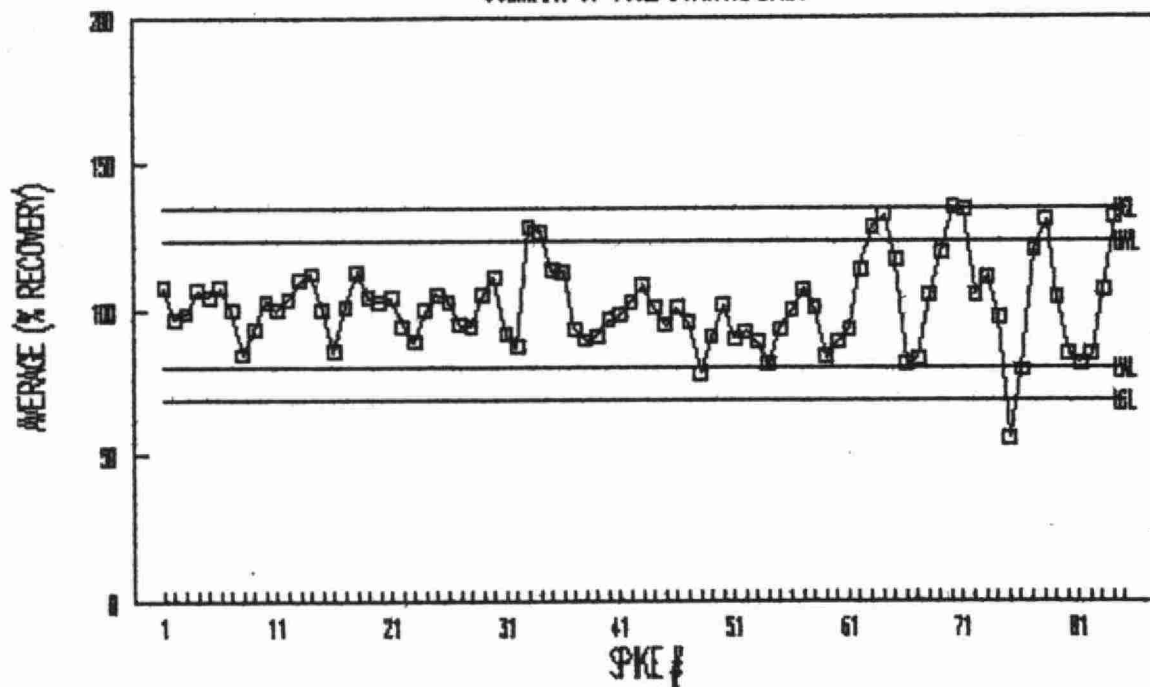
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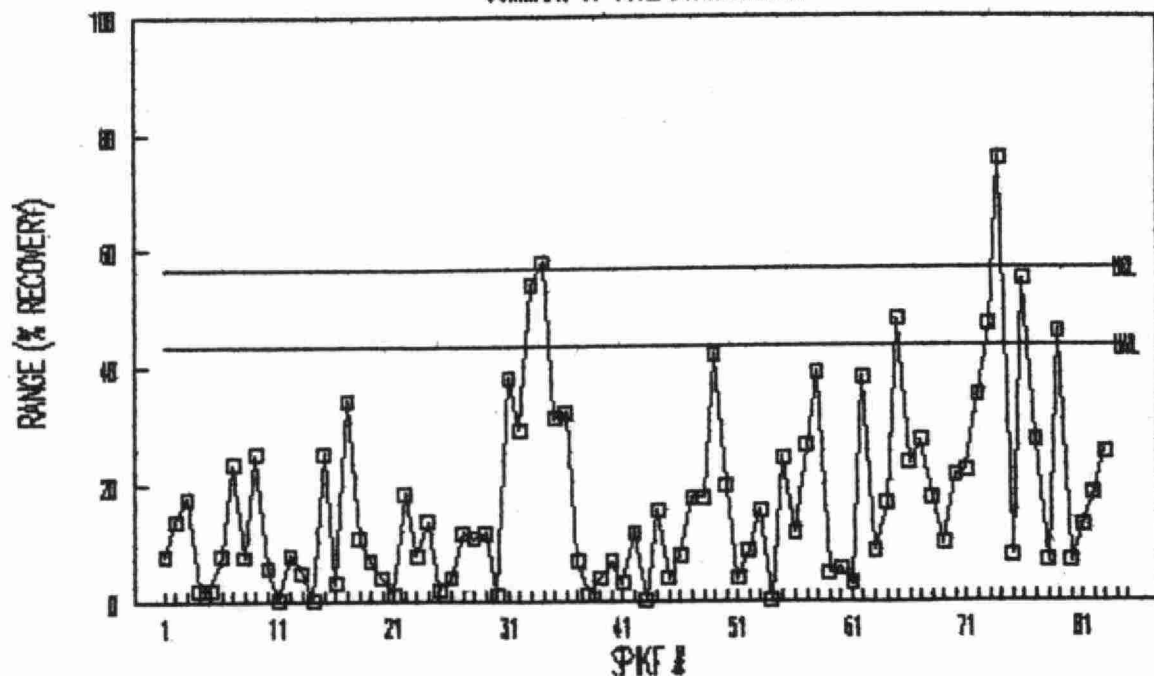
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SUMMARY OF 1992 CONTROL DATA



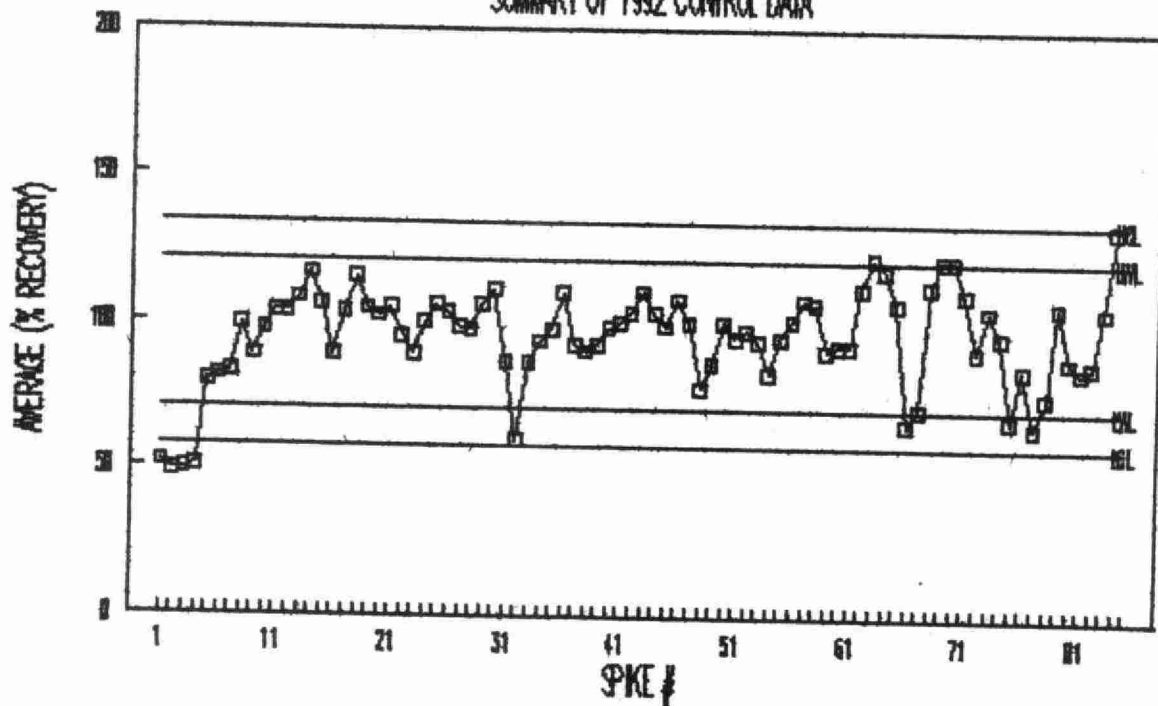
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SUMMARY OF 1992 CONTROL DATA



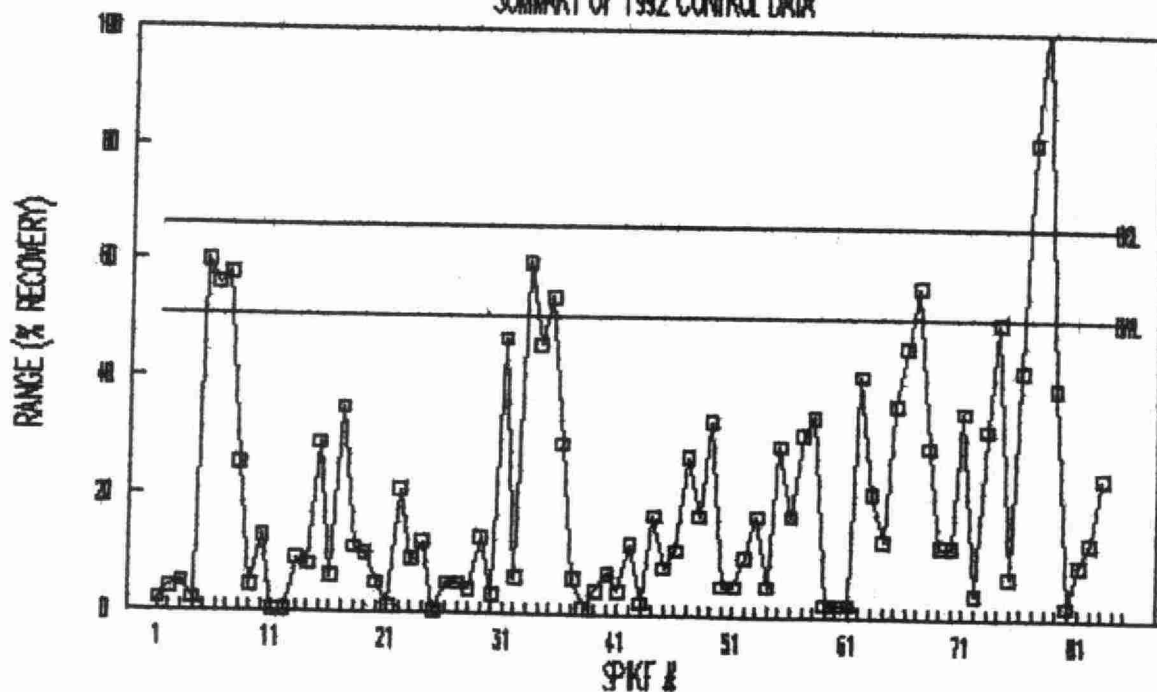
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SUMMARY OF 1992 CONTROL DATA



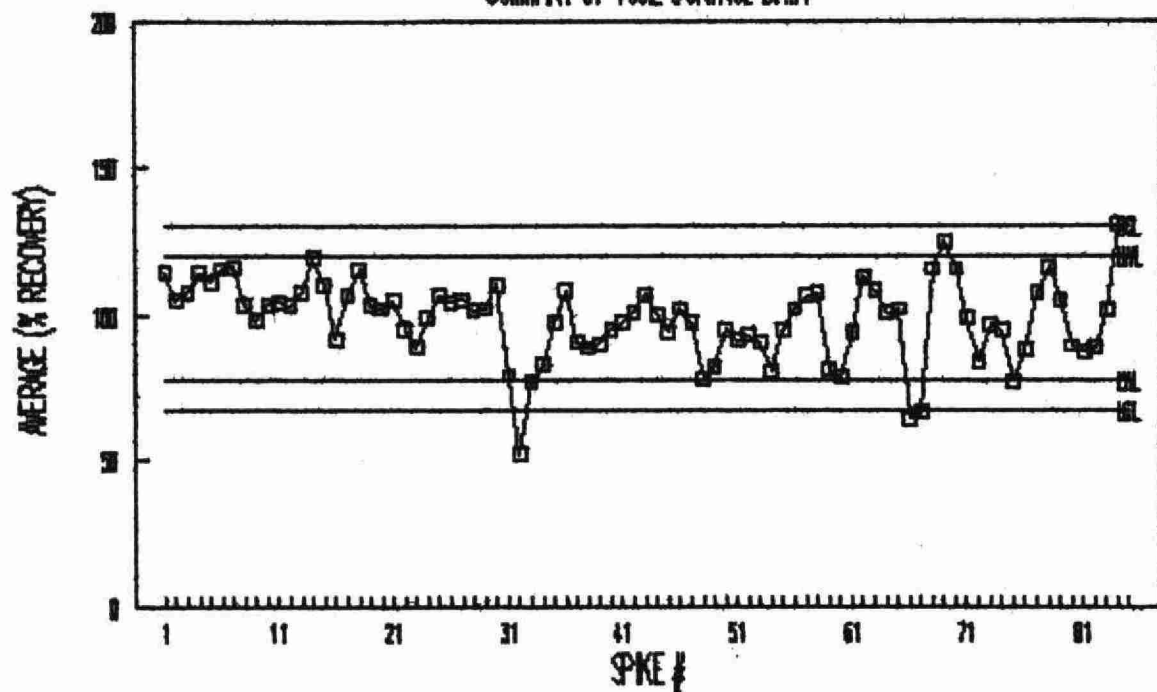
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SUMMARY OF 1992 CONTROL DATA



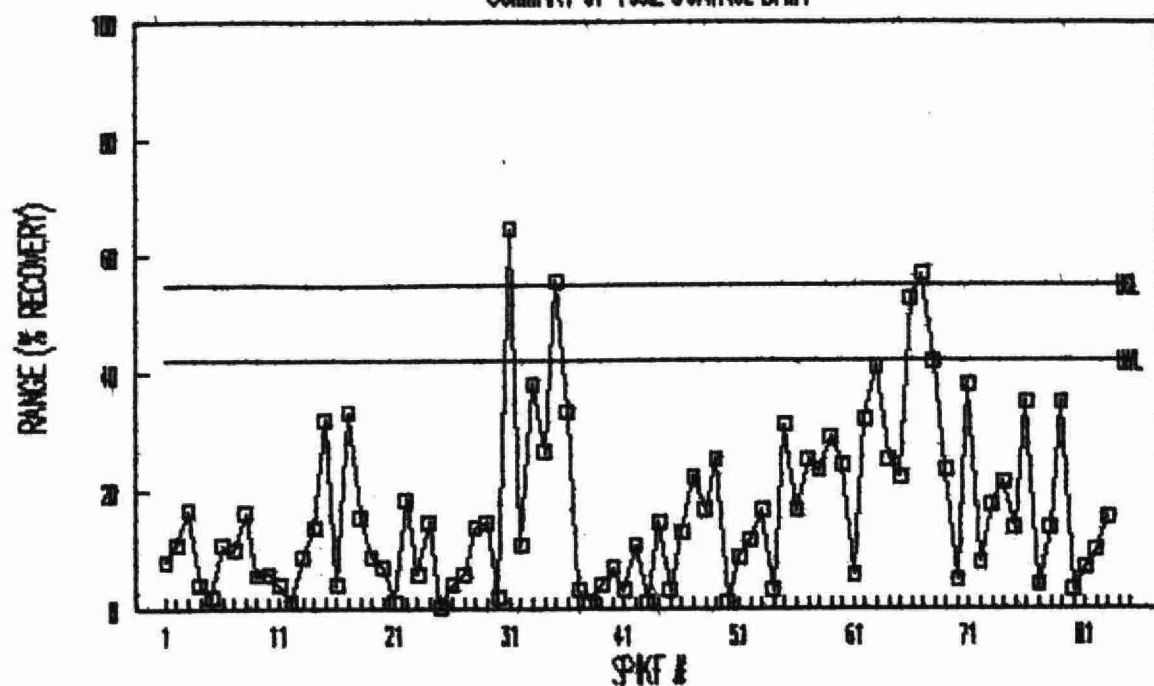
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SUMMARY OF 1992 CONTROL DATA



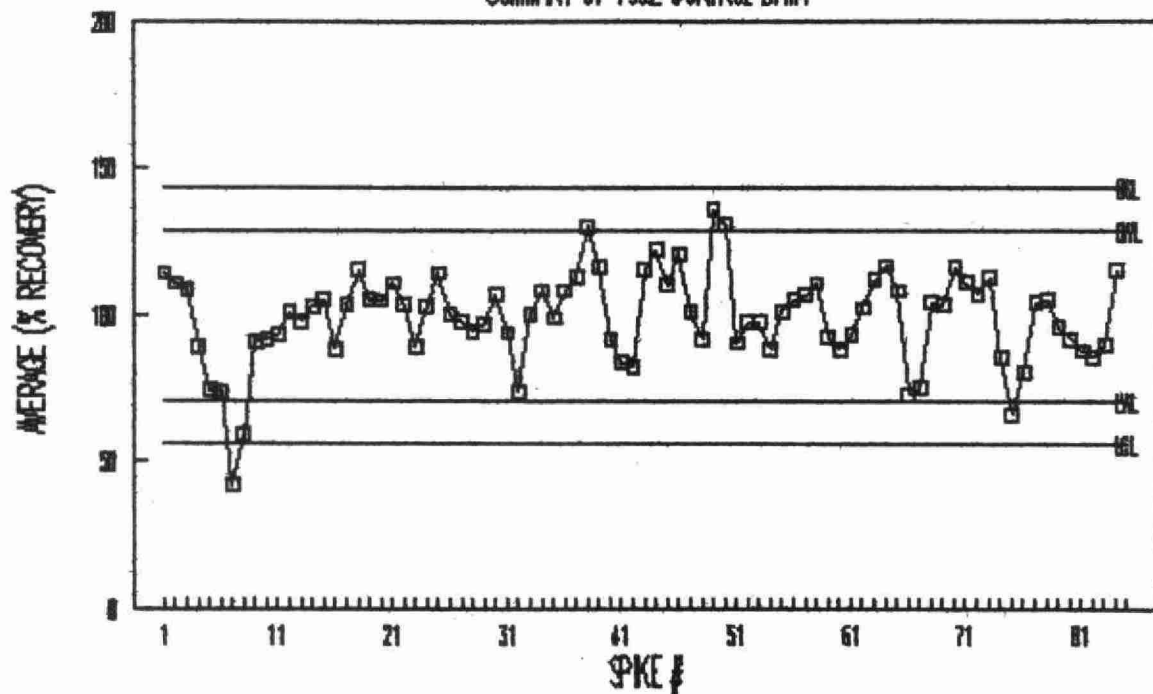
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SUMMARY OF 1992 CONTROL DATA



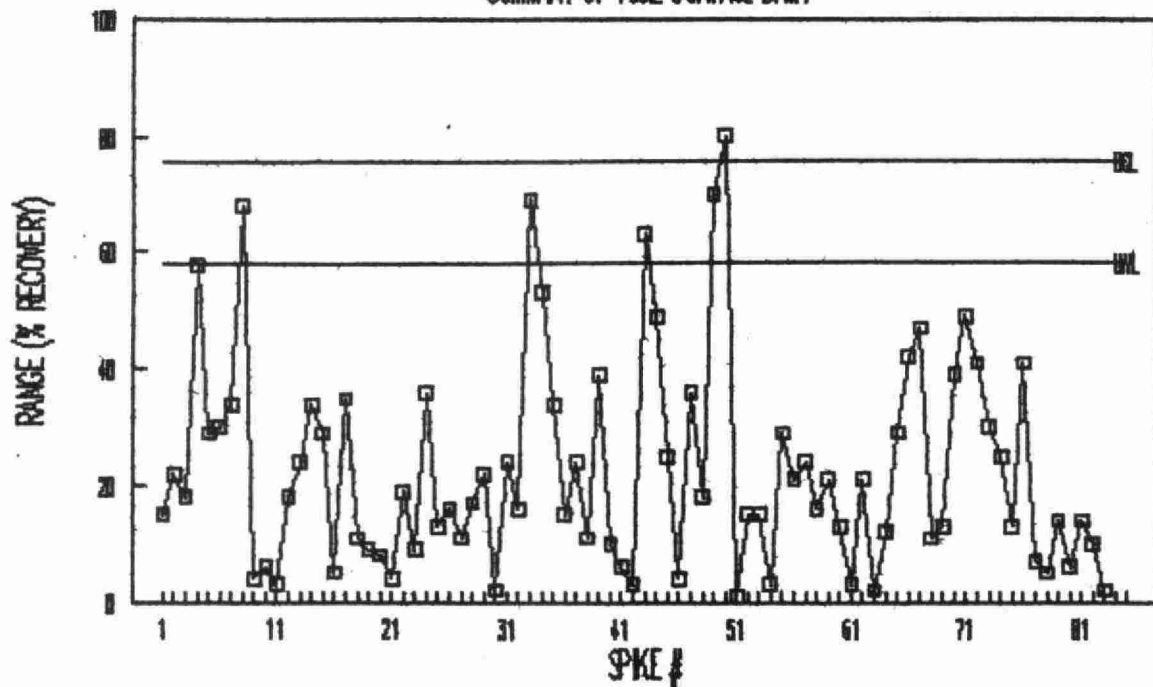
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SUMMARY OF 1992 CONTROL DATA



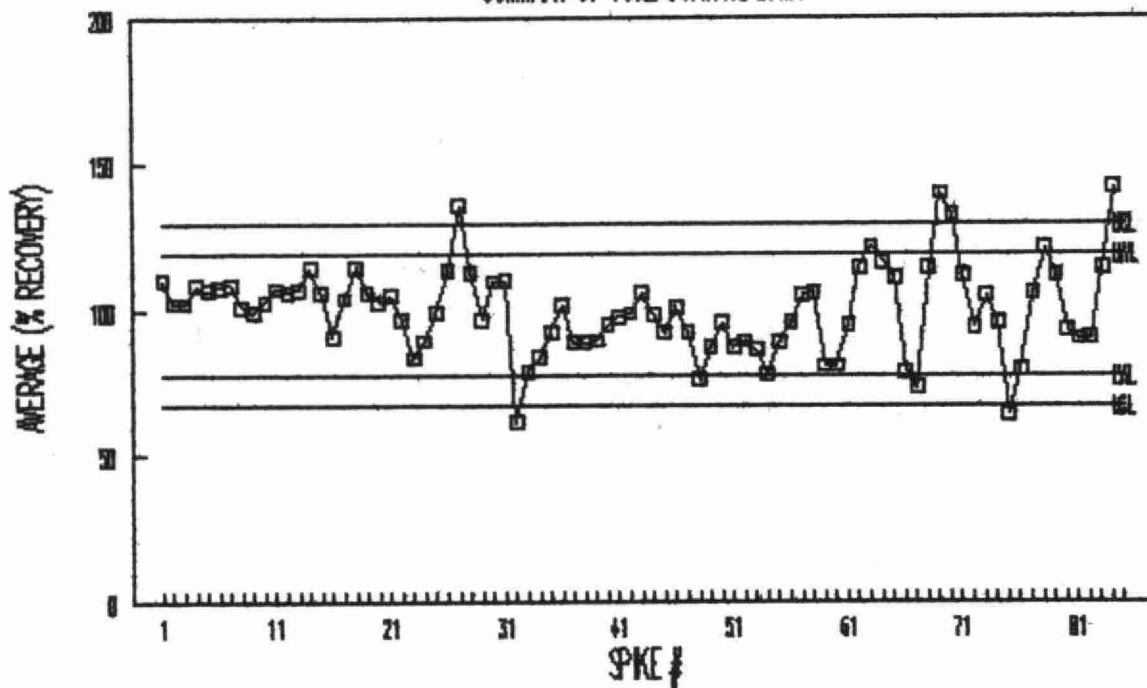
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SUMMARY OF 1992 CONTROL DATA



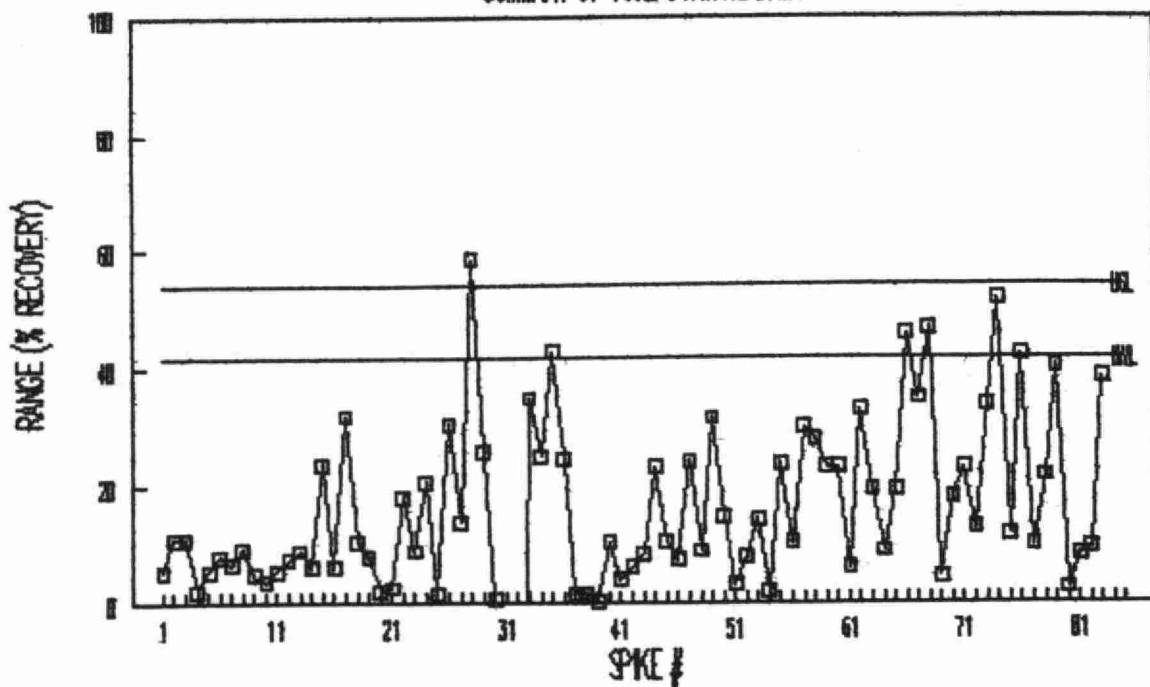
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SUMMARY OF 1992 CONTROL DATA



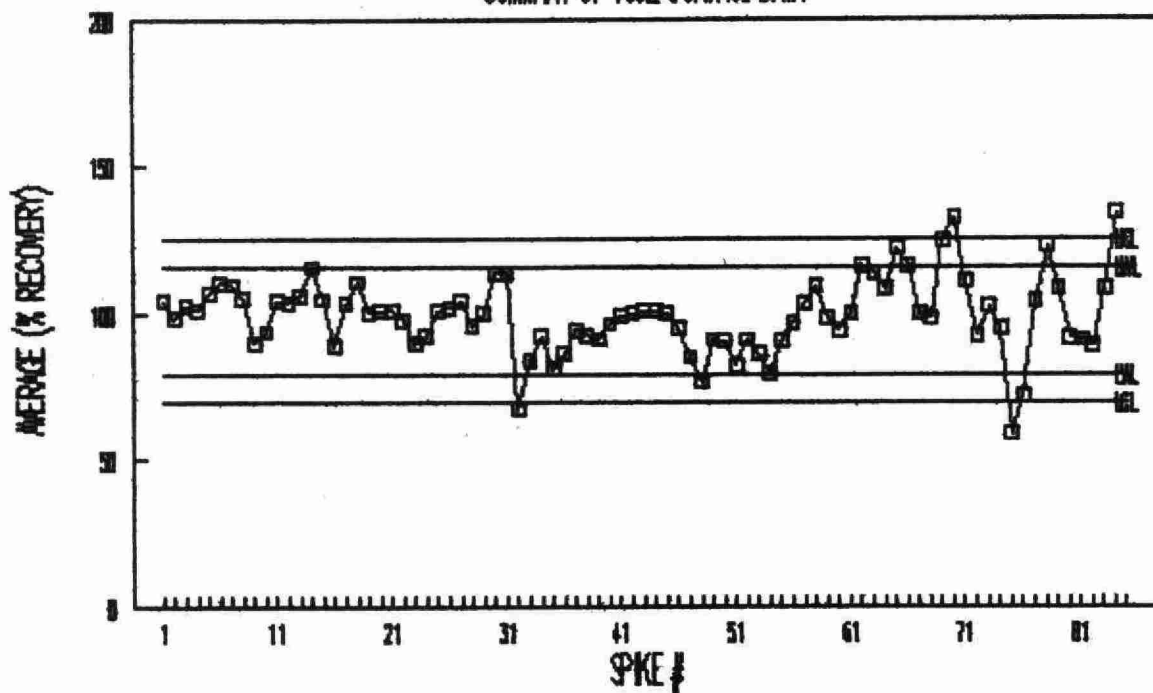
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SUMMARY OF 1992 CONTROL DATA



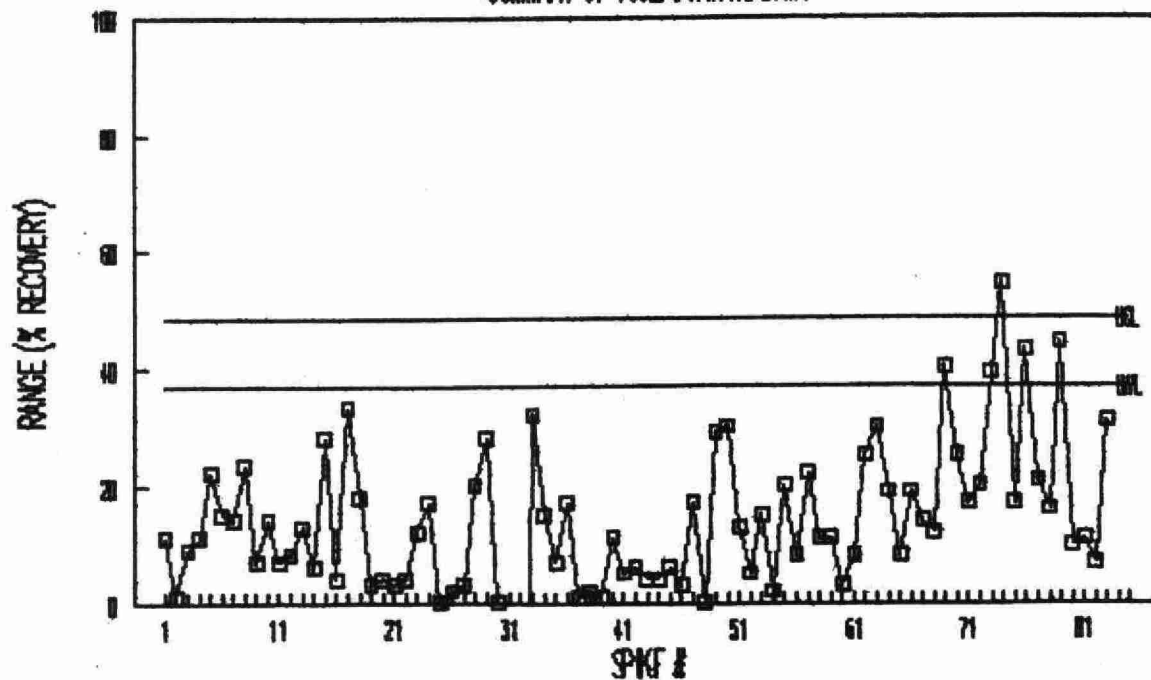
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SUMMARY OF 1992 CONTROL DATA



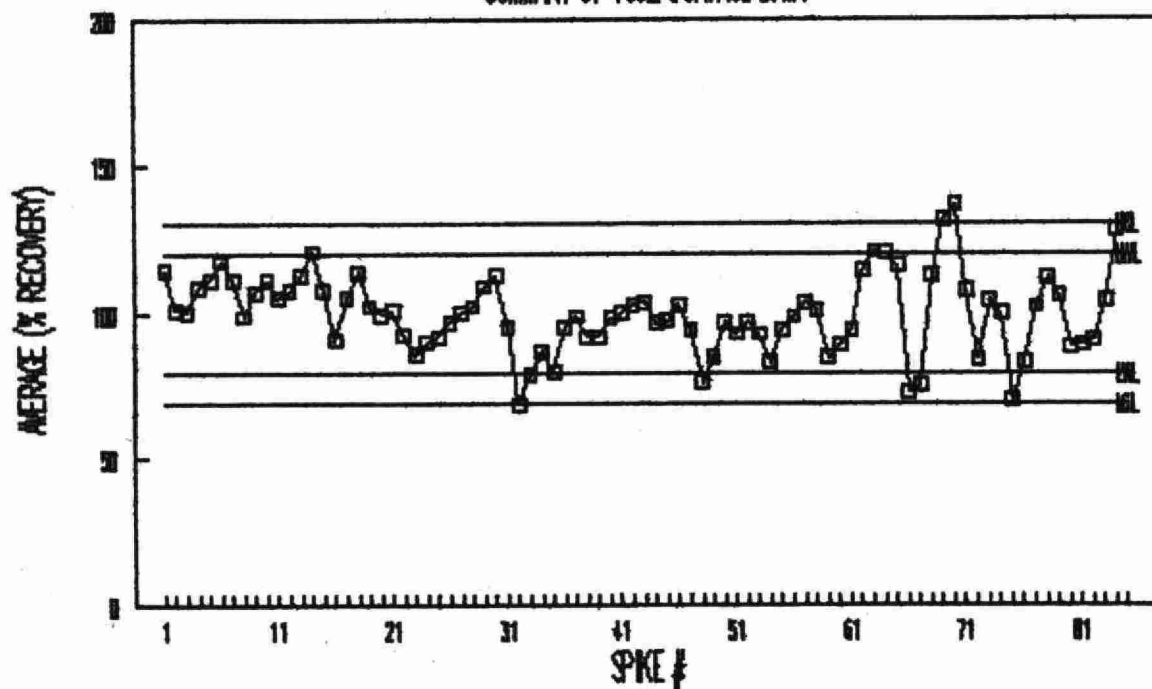
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SUMMARY OF 1992 CONTROL DATA



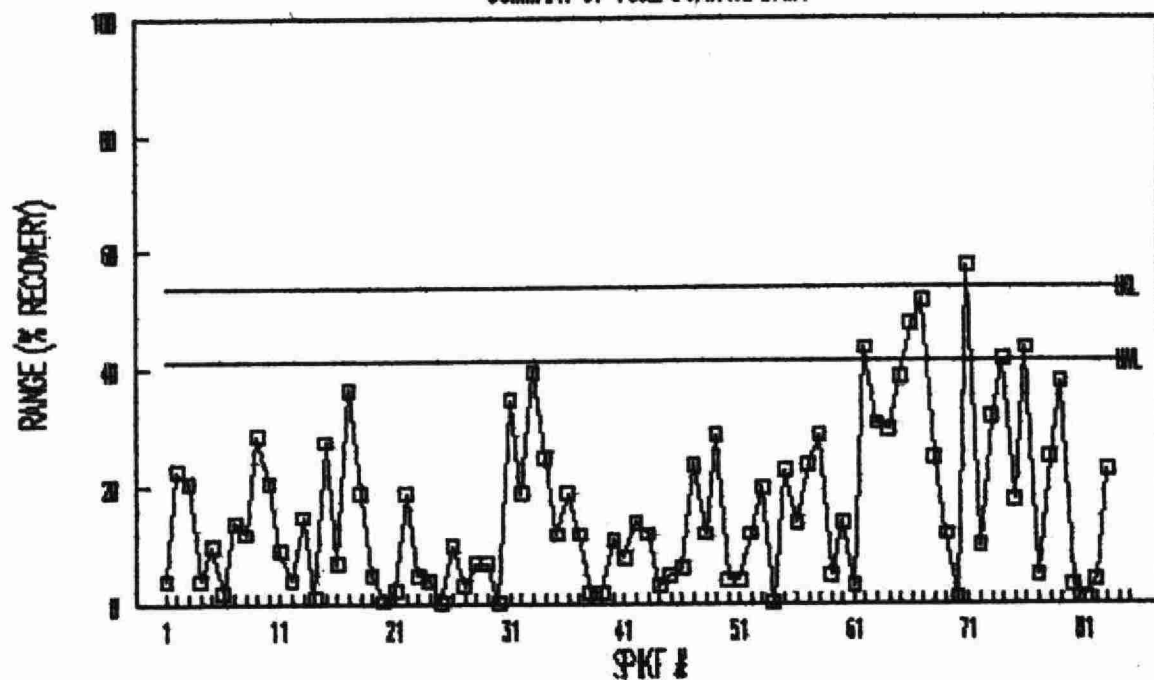
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SUMMARY OF 1992 CONTROL DATA

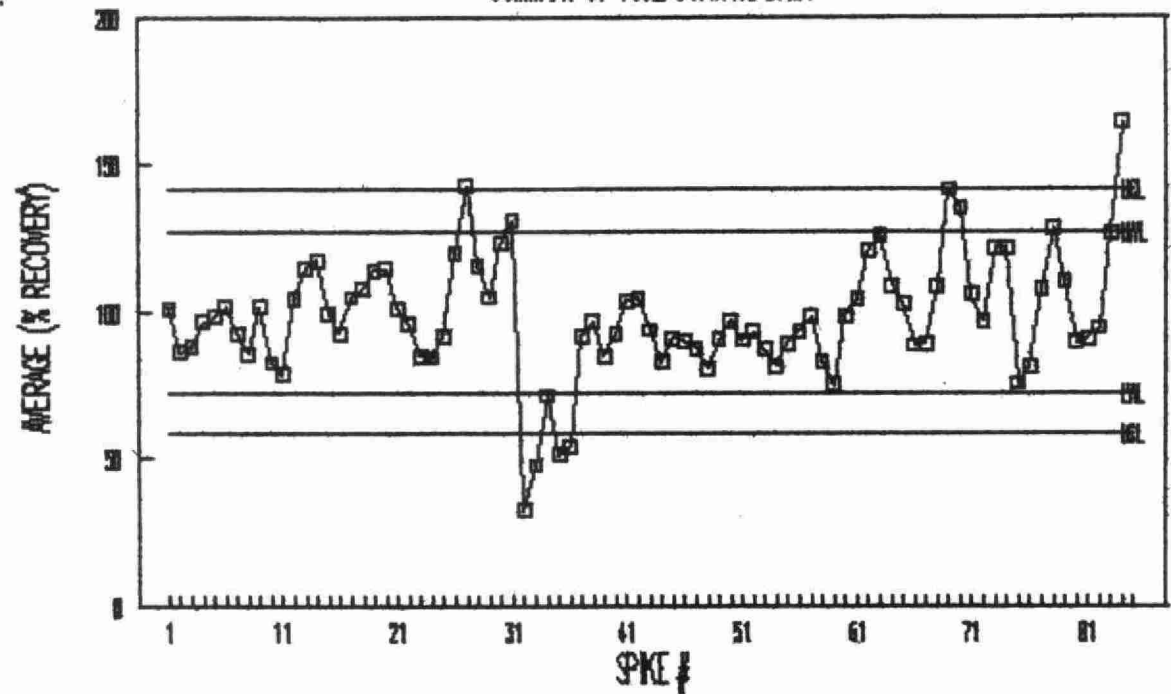


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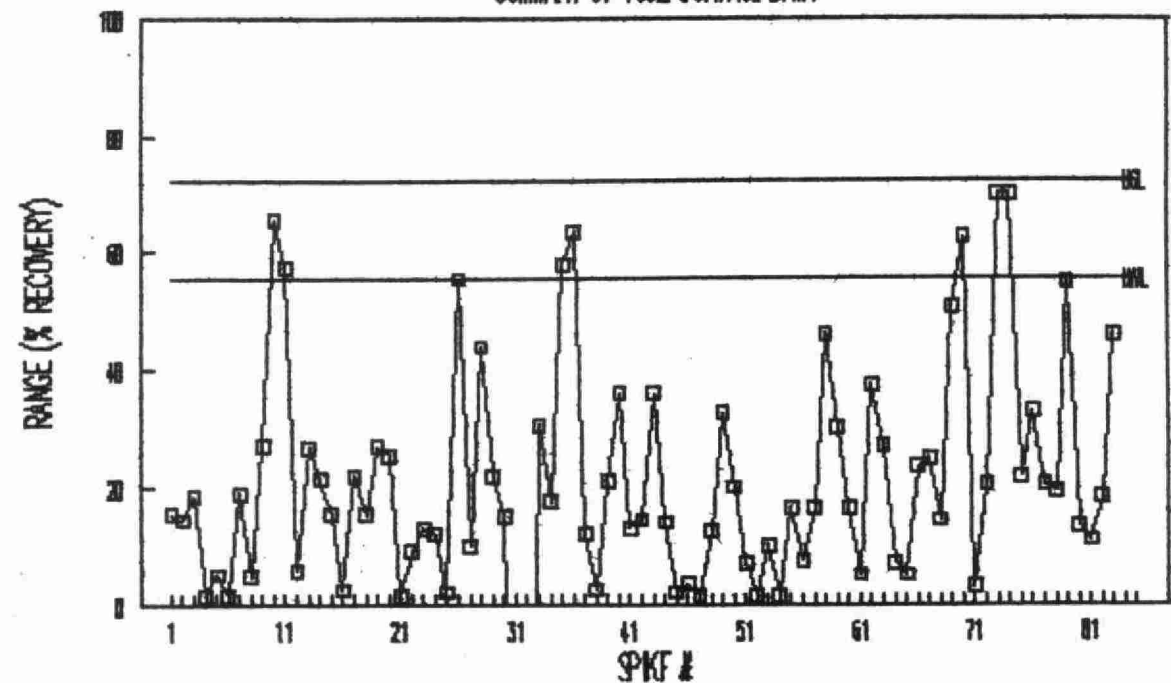
SUMMARY OF 1992 CONTROL DATA



MISA19/20:PM26DT SUMMARY OF 1992 CONTROL DATA

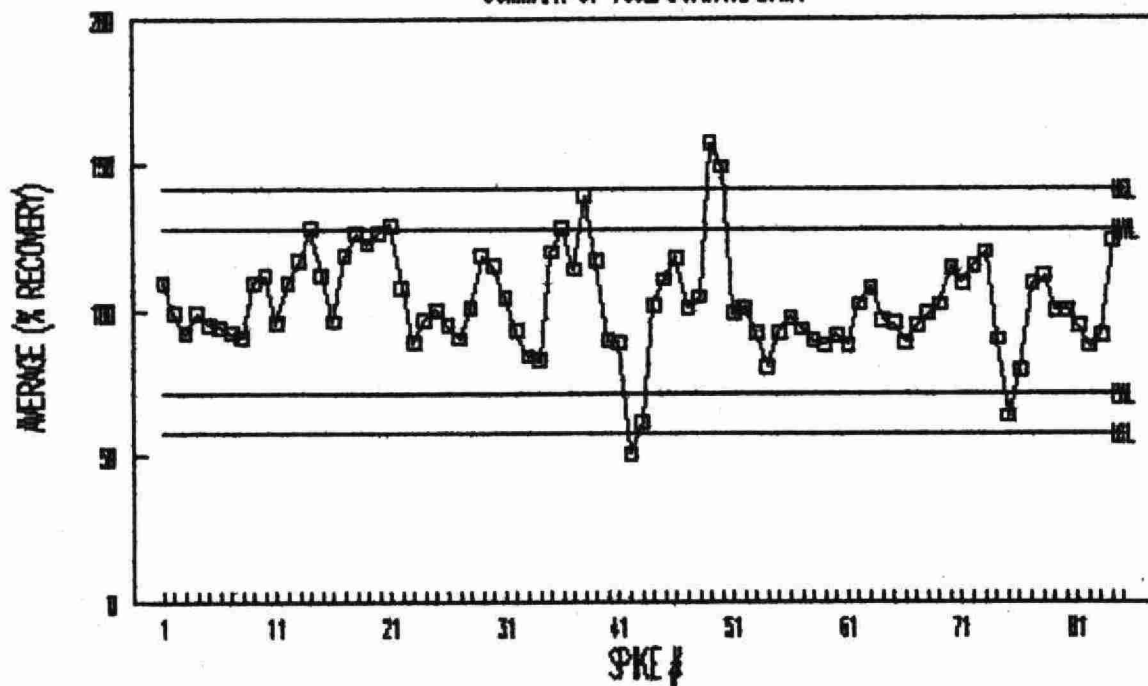


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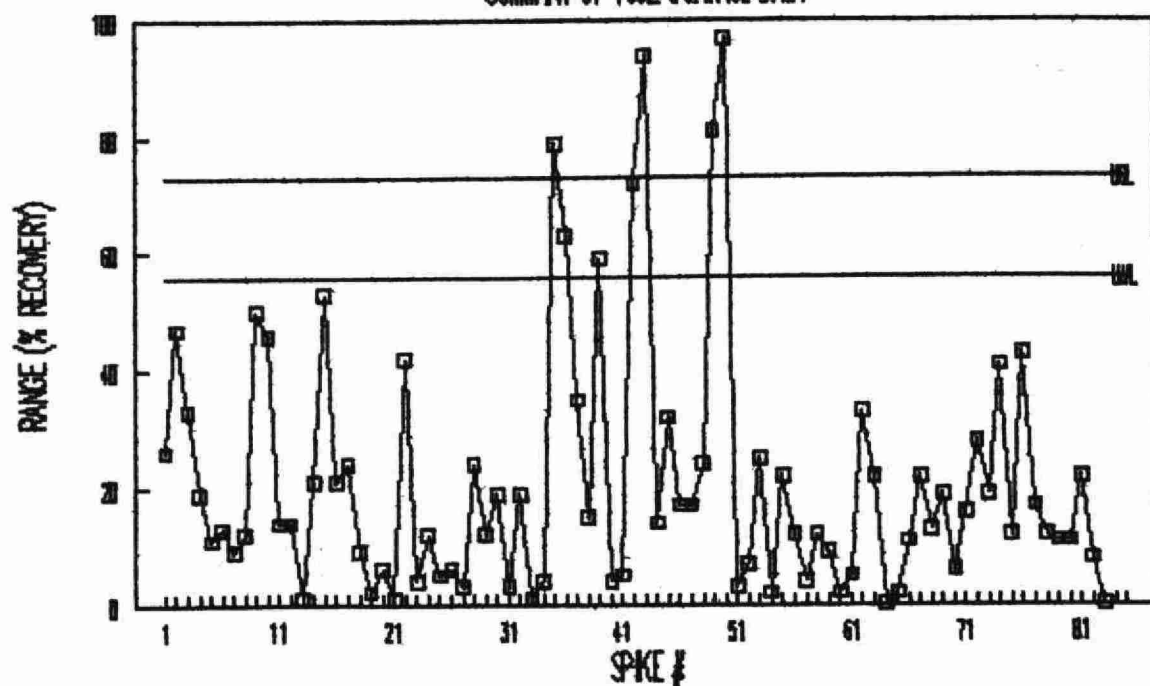
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SUMMARY OF 1992 CONTROL DATA



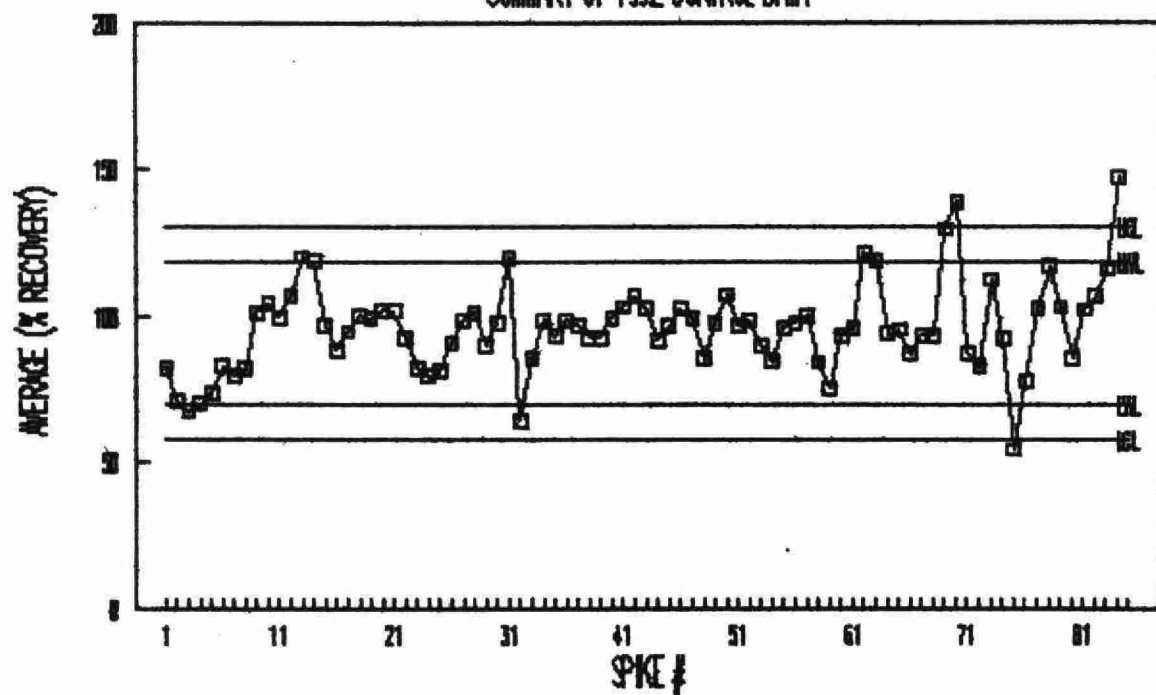
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SUMMARY OF 1992 CONTROL DATA



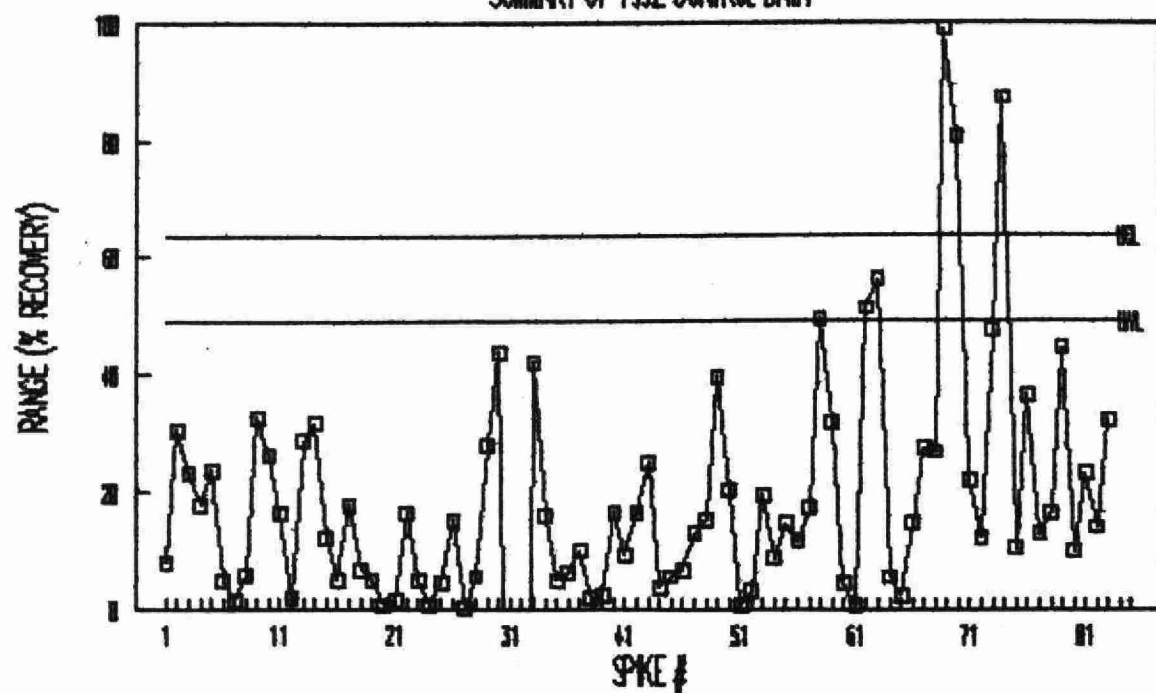
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SUMMARY OF 1992 CONTROL DATA



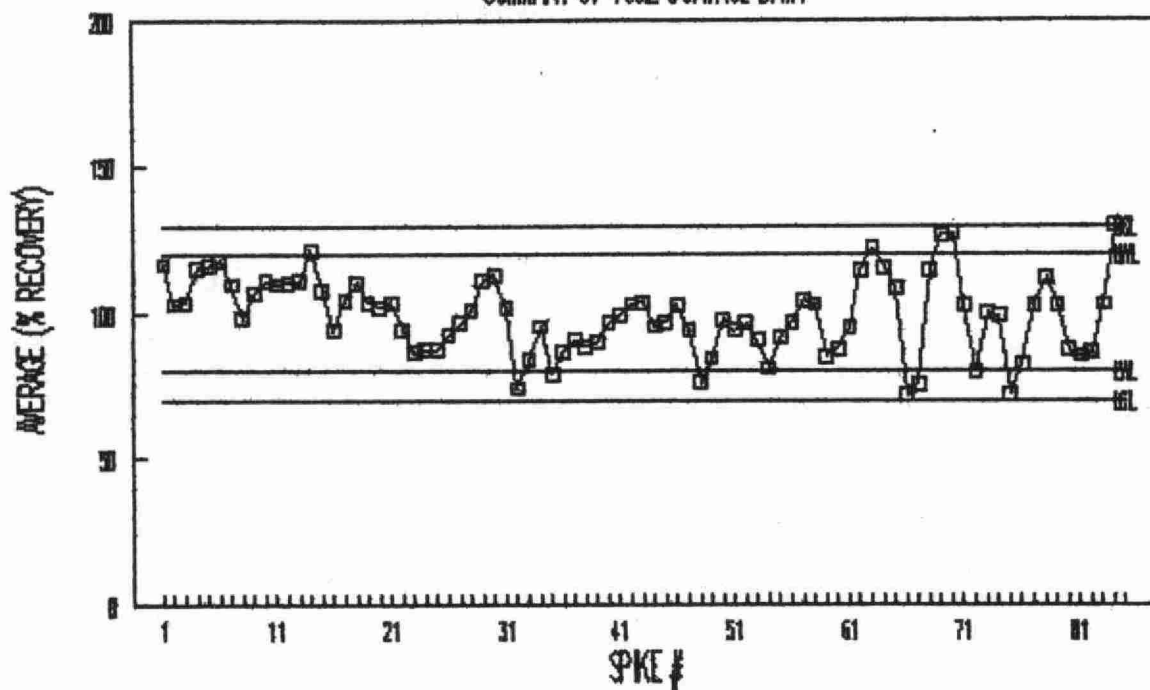
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SUMMARY OF 1992 CONTROL DATA



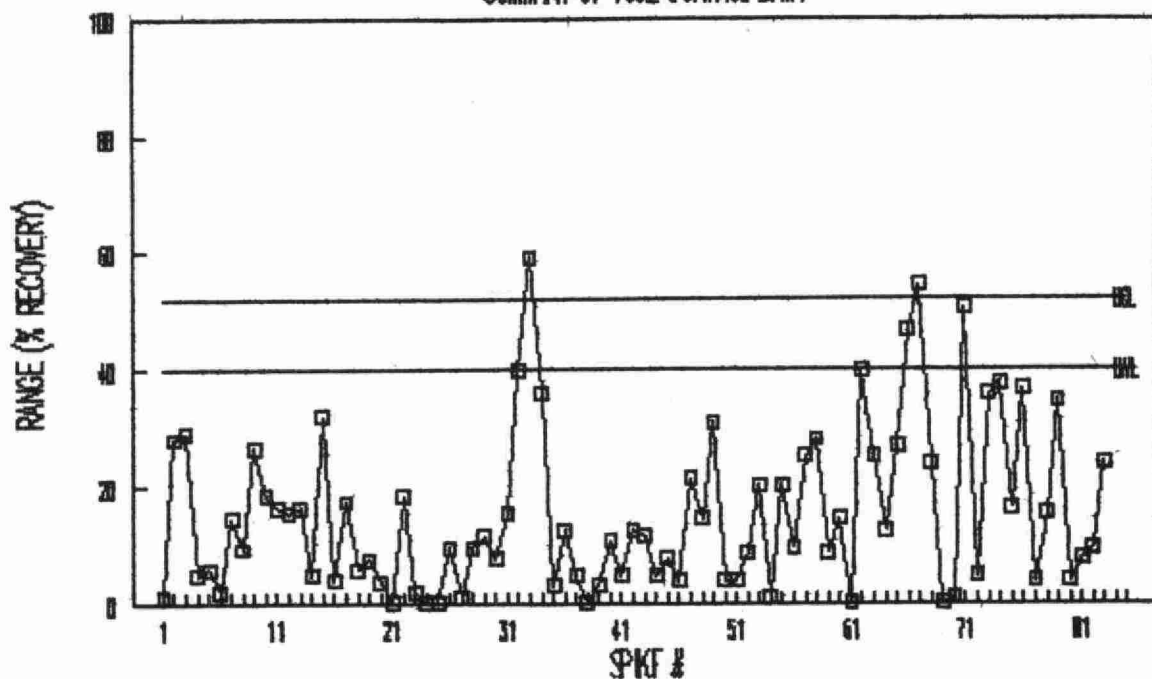
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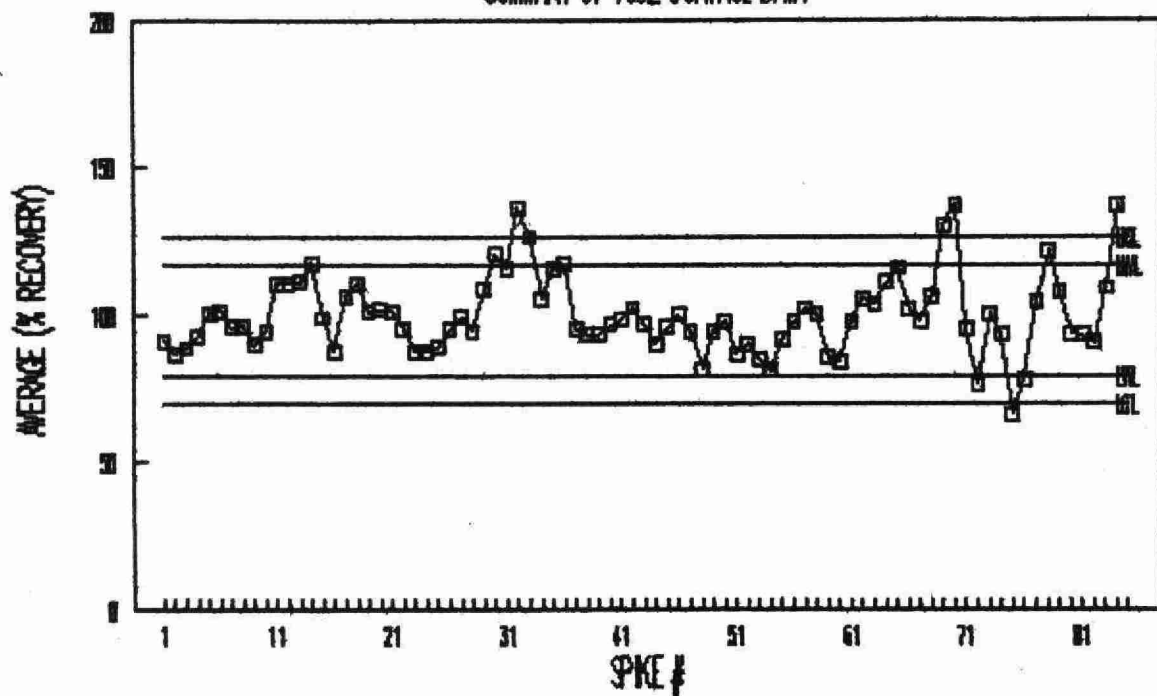
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SUMMARY OF 1992 CONTROL DATA



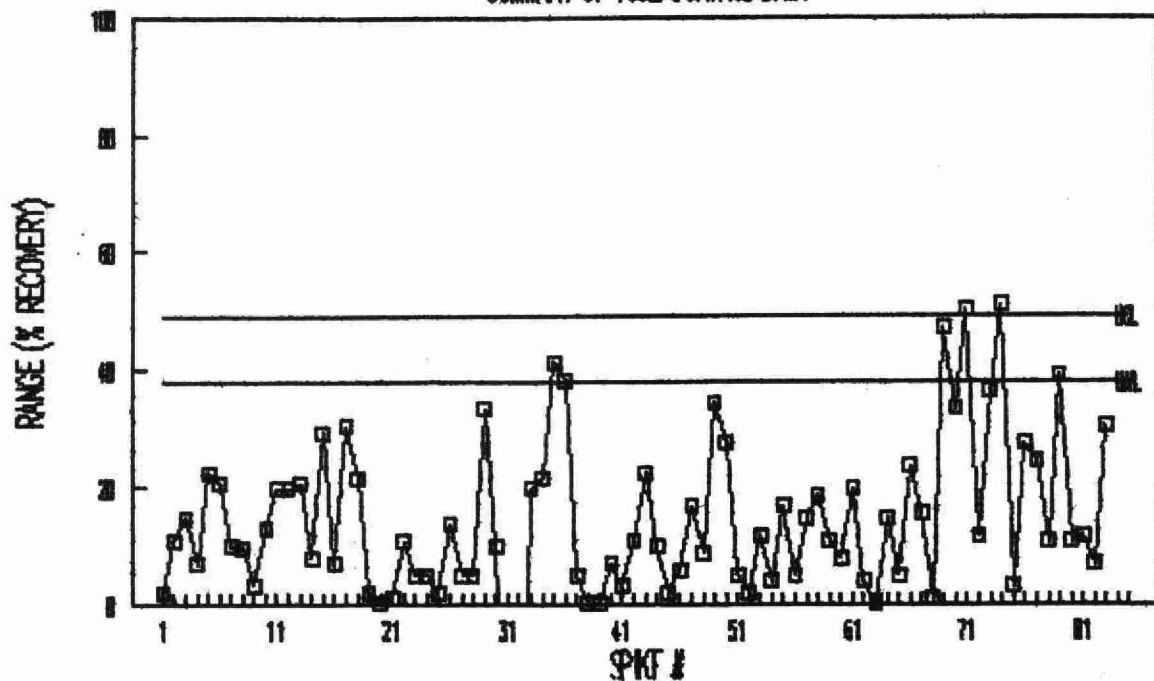
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SUMMARY OF 1992 CONTROL DATA



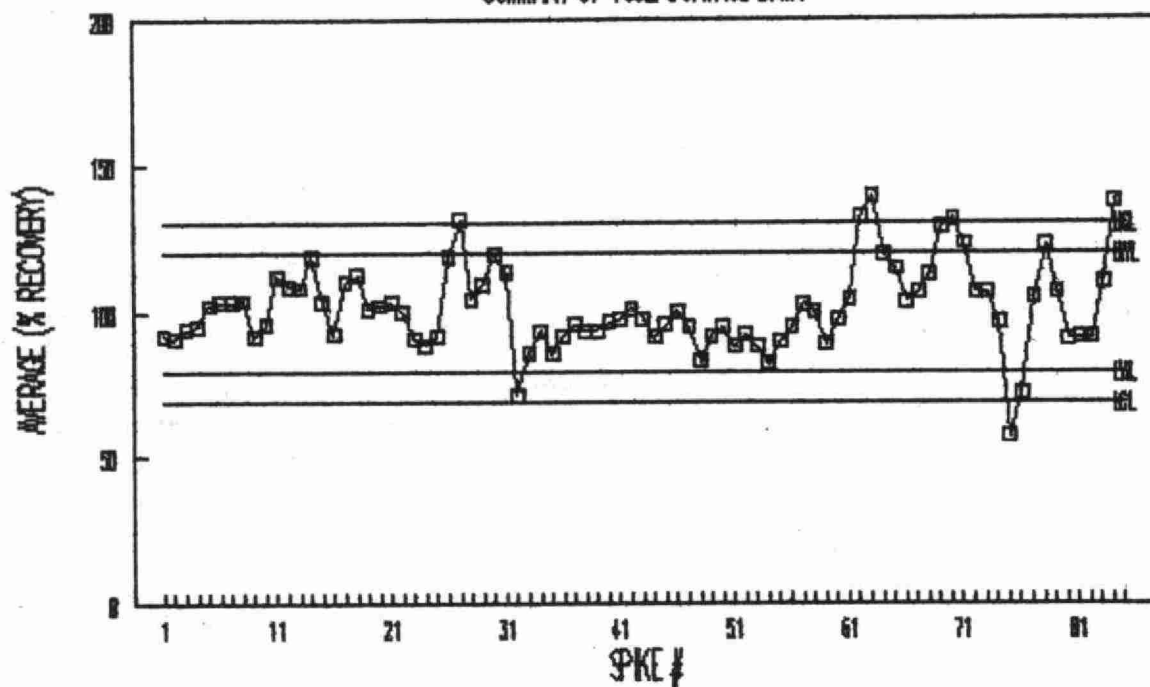
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SUMMARY OF 1992 CONTROL DATA



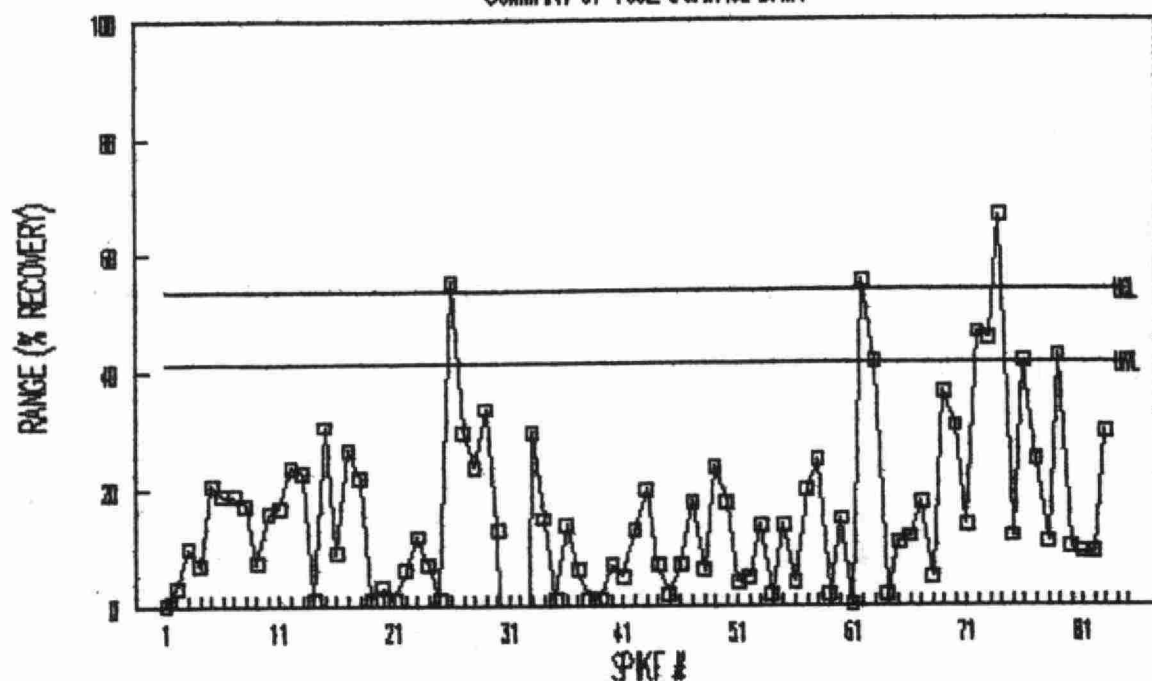
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SUMMARY OF 1992 CONTROL DATA



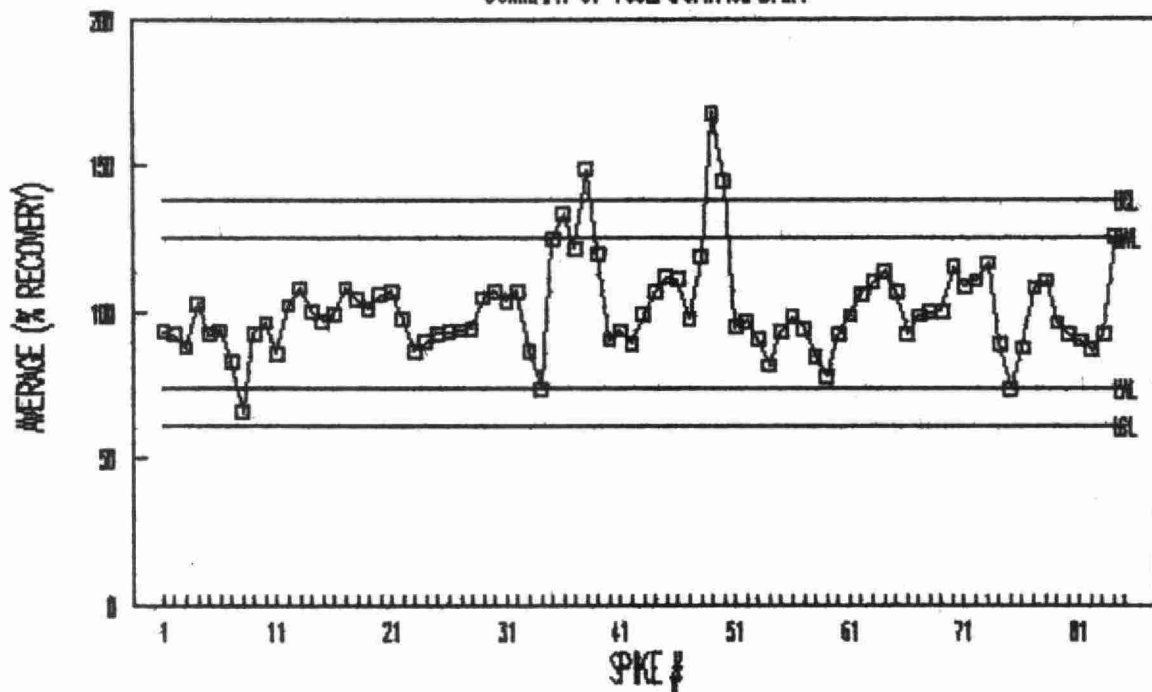
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SUMMARY OF 1992 CONTROL DATA



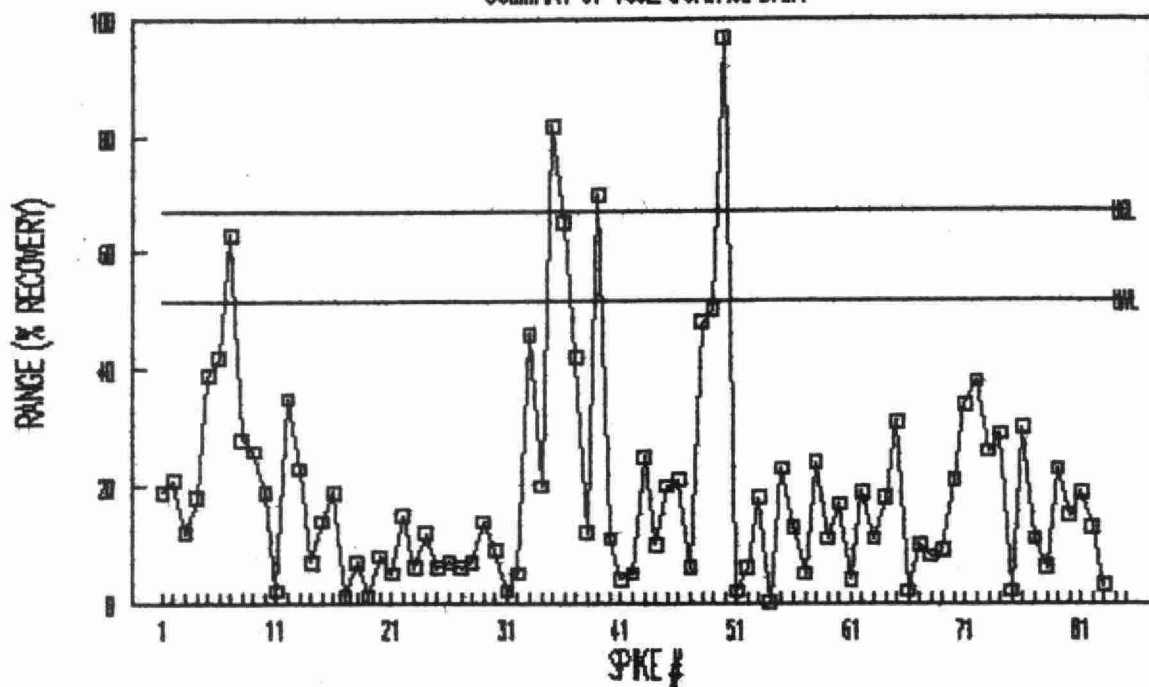
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SUMMARY OF 1992 CONTROL DATA



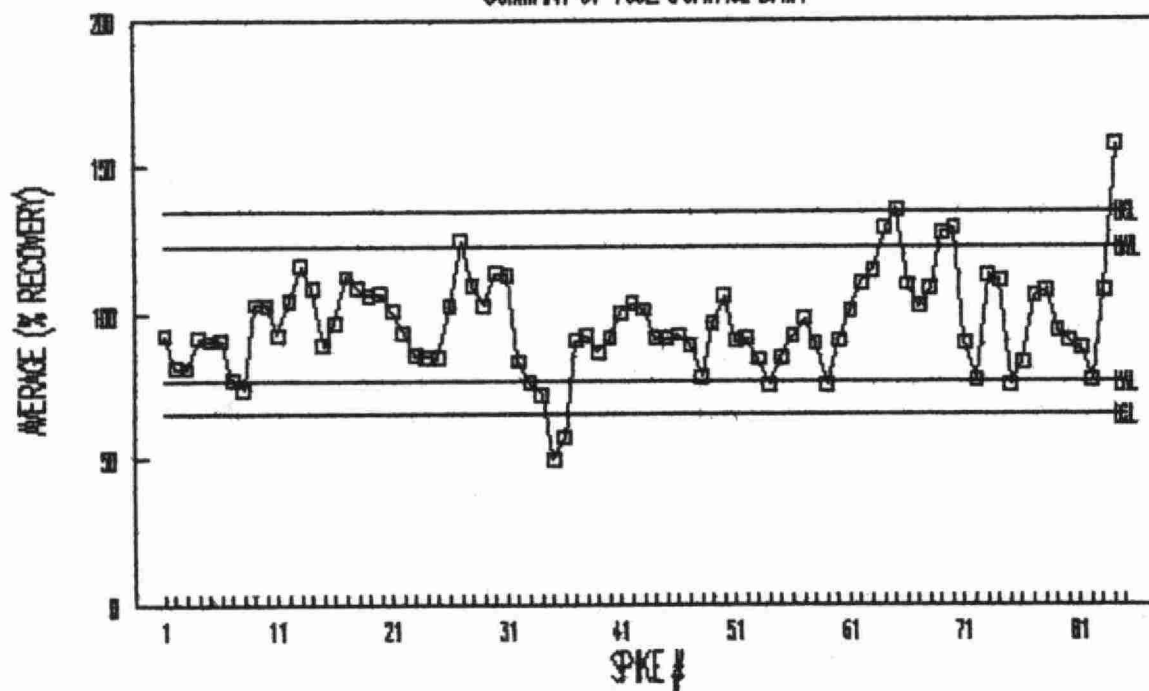
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SUMMARY OF 1992 CONTROL DATA



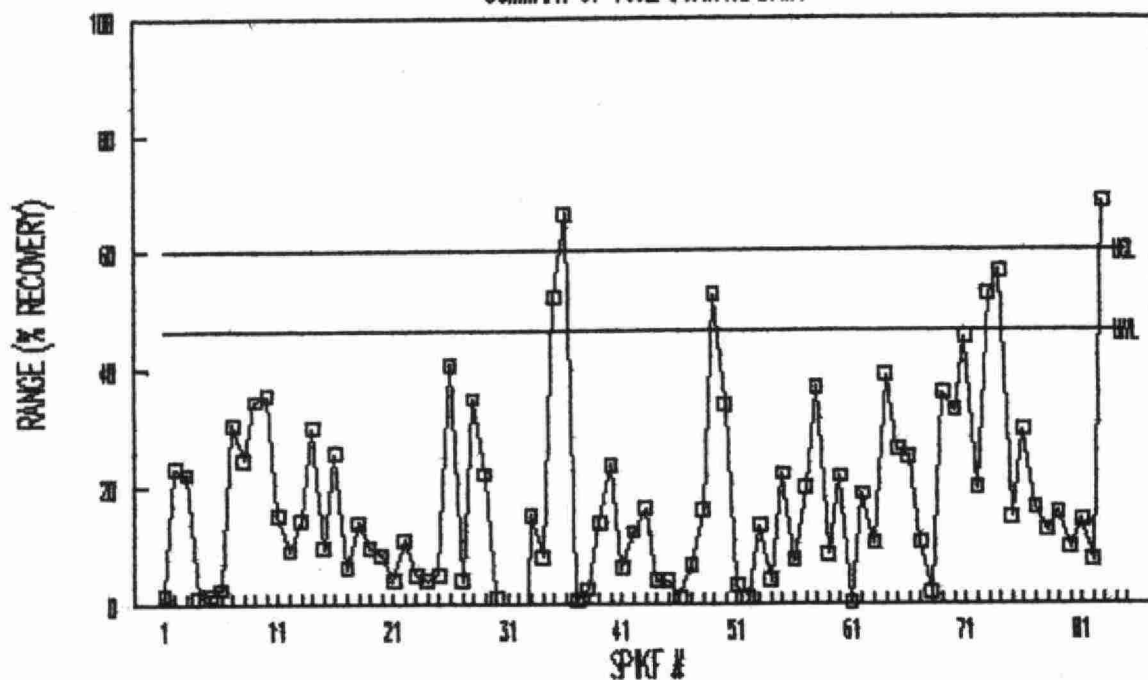
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SUMMARY OF 1992 CONTROL DATA



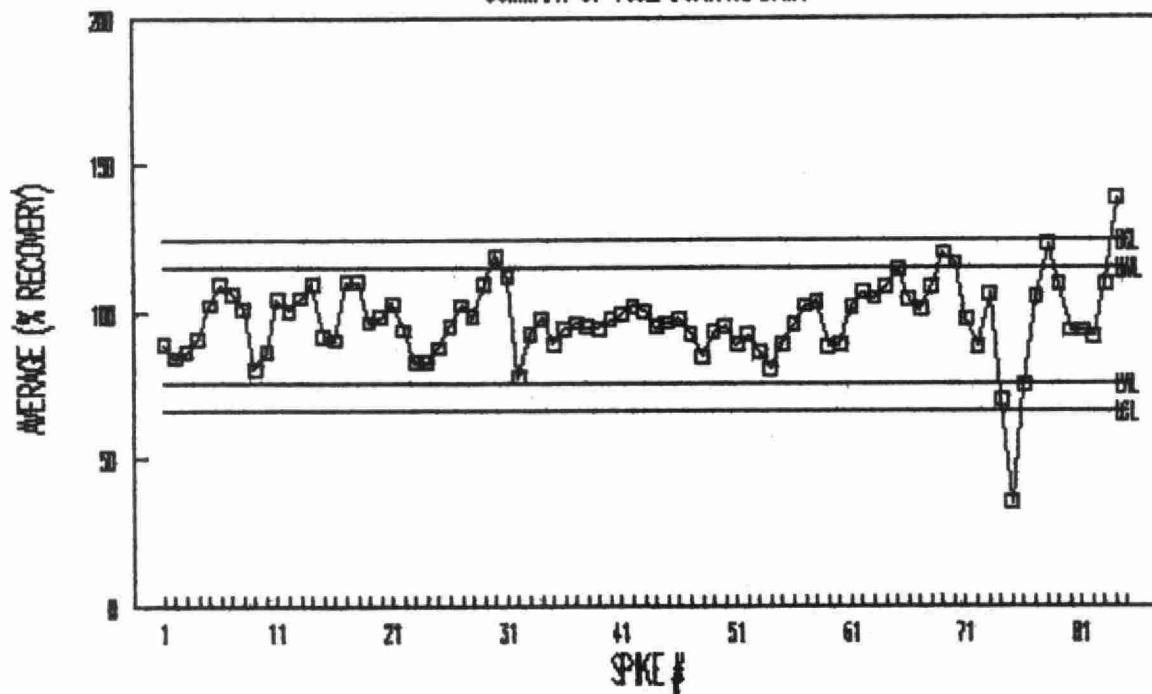
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SUMMARY OF 1992 CONTROL DATA



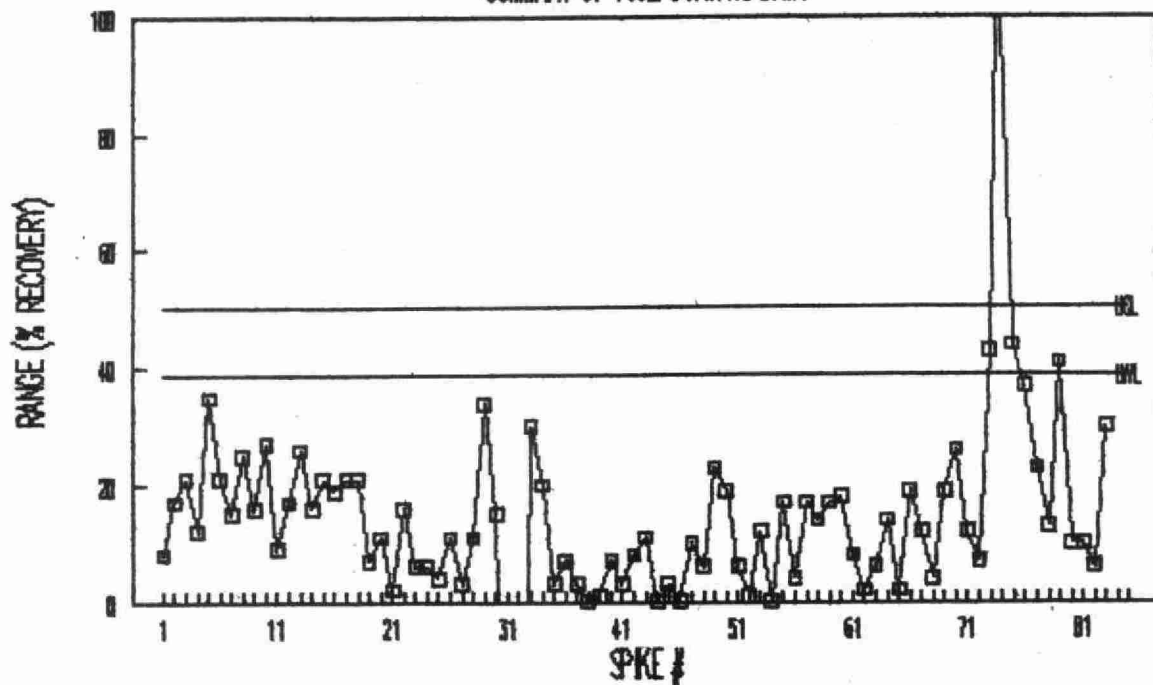
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SUMMARY OF 1992 CONTROL DATA



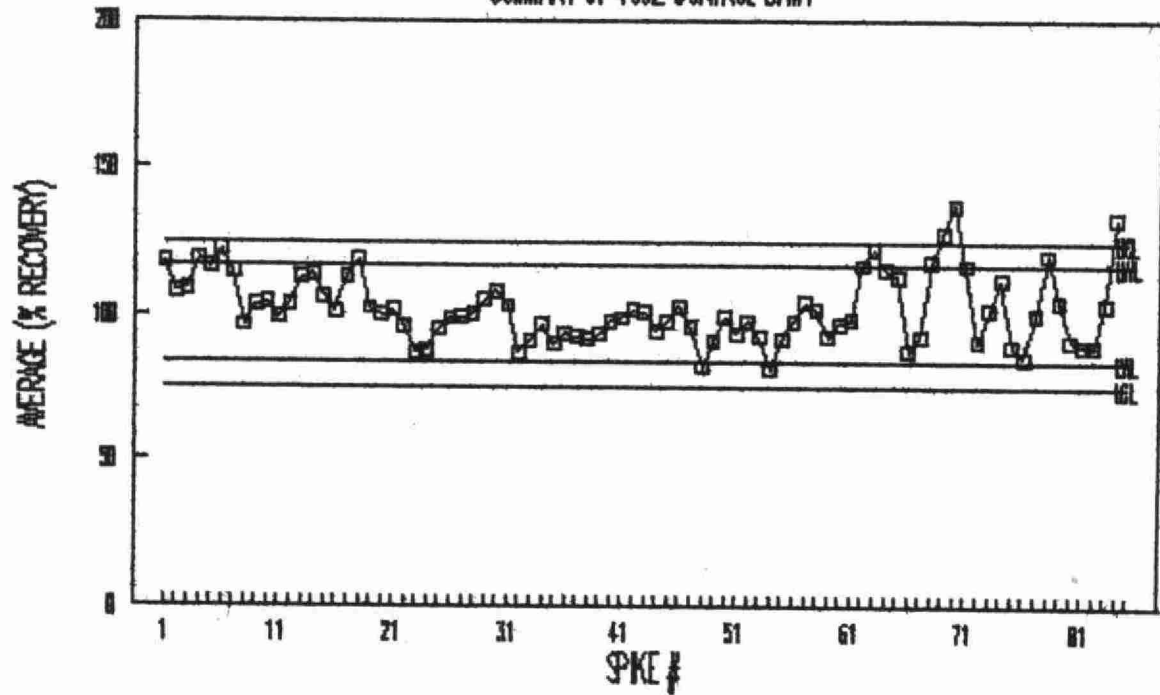
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SUMMARY OF 1992 CONTROL DATA



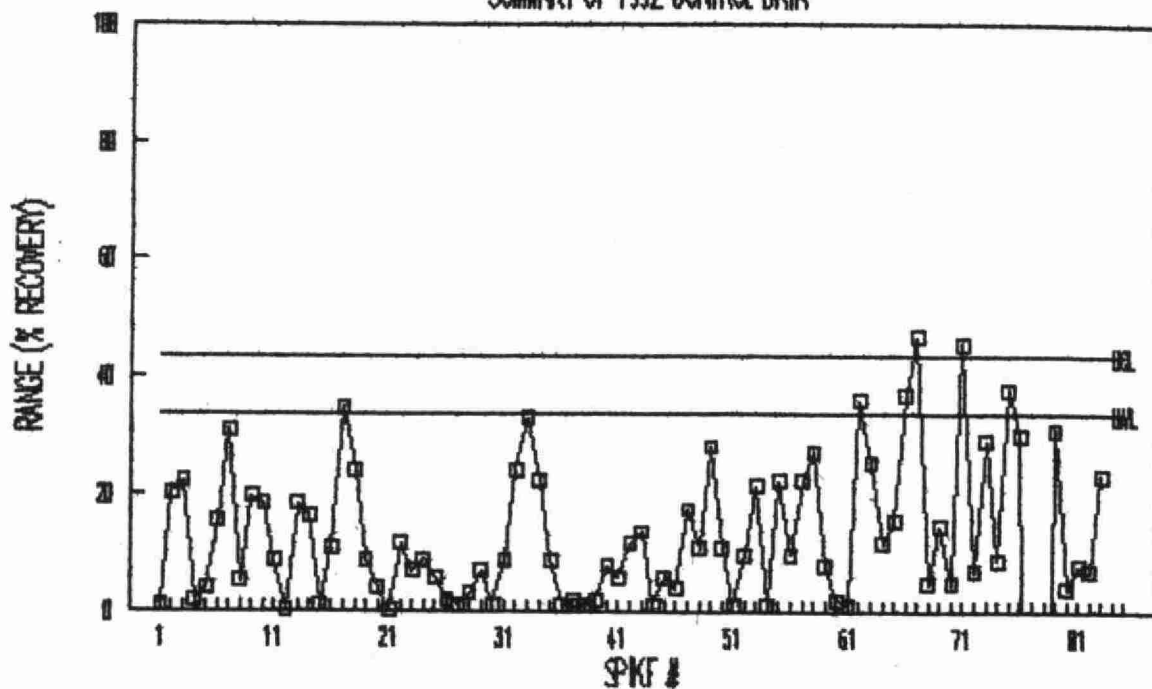
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SUMMARY OF 1992 CONTROL DATA



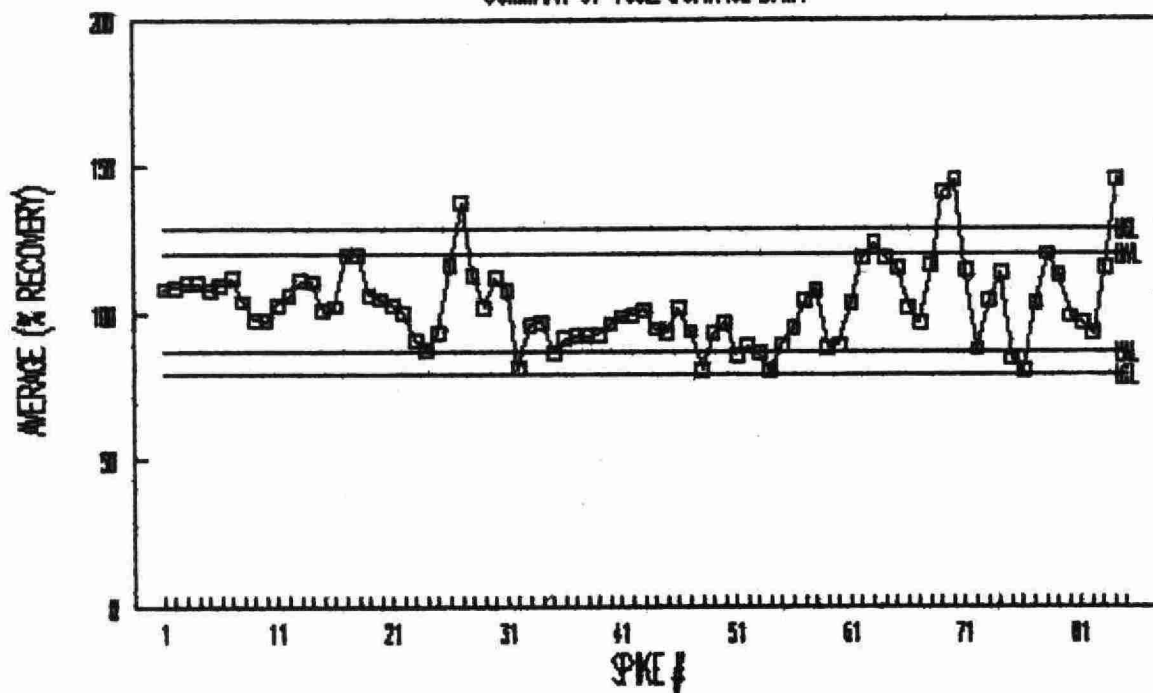
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SUMMARY OF 1992 CONTROL DATA



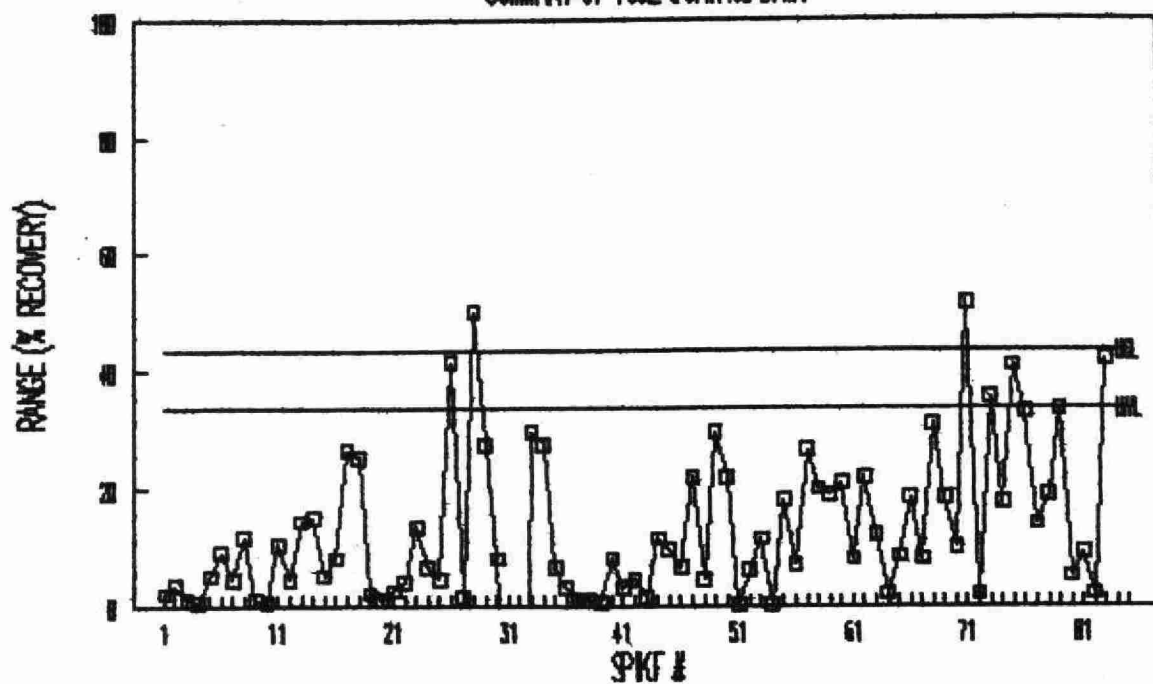
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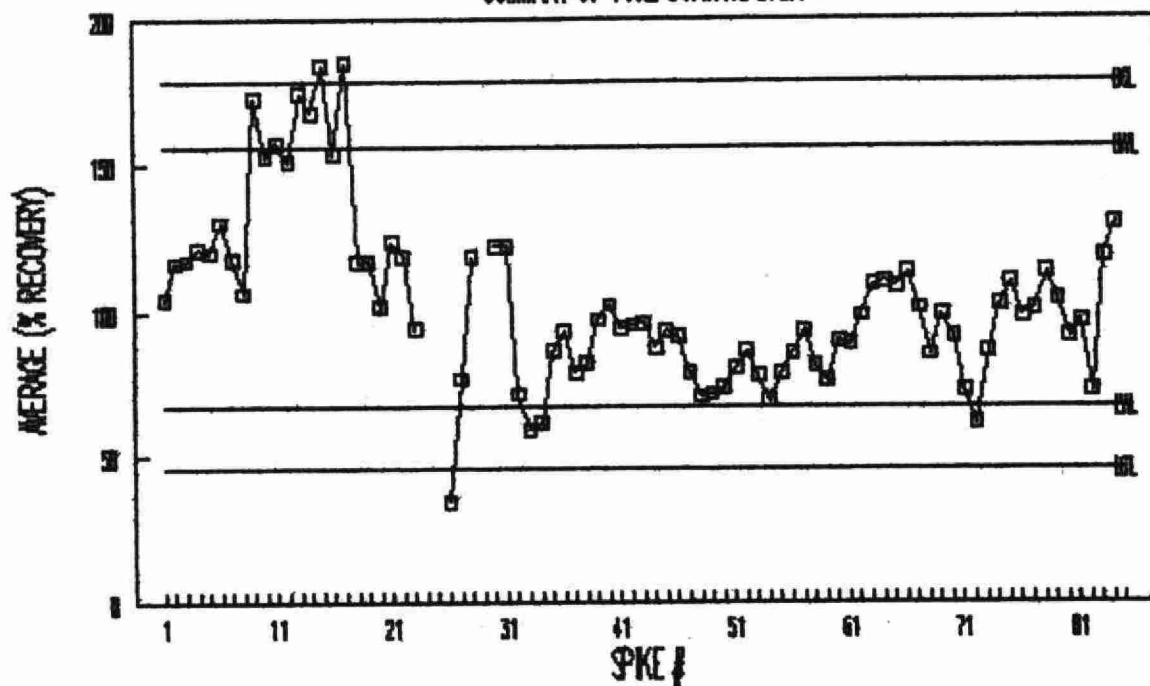
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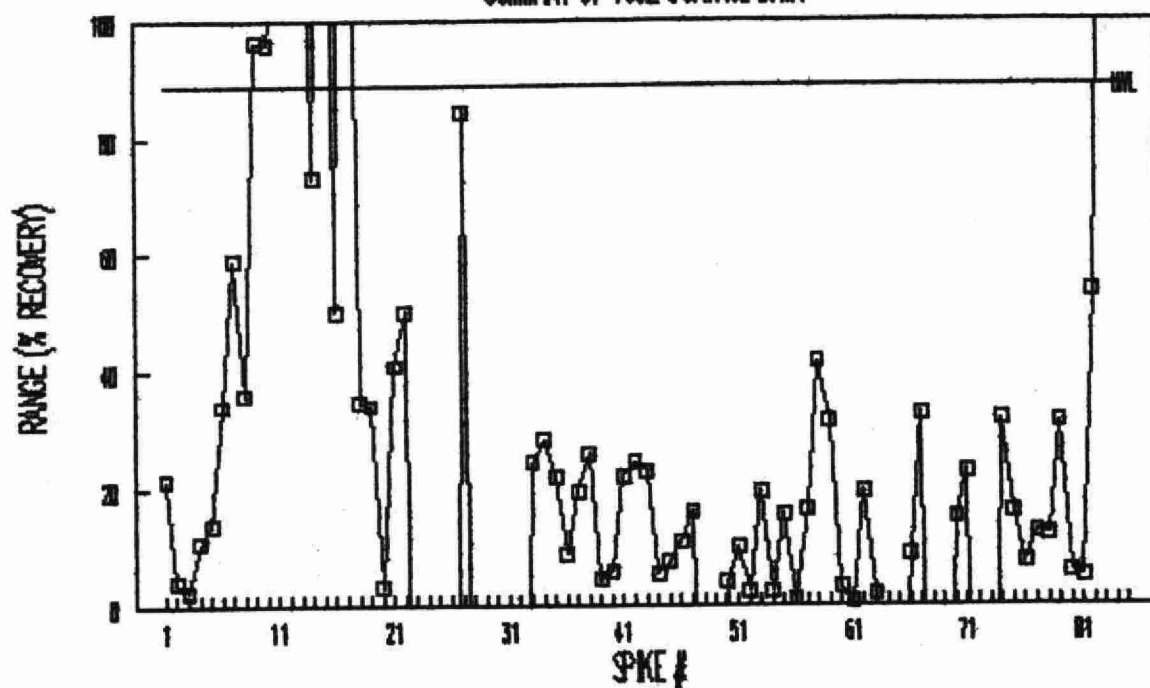
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SUMMARY OF 1992 CONTROL DATA



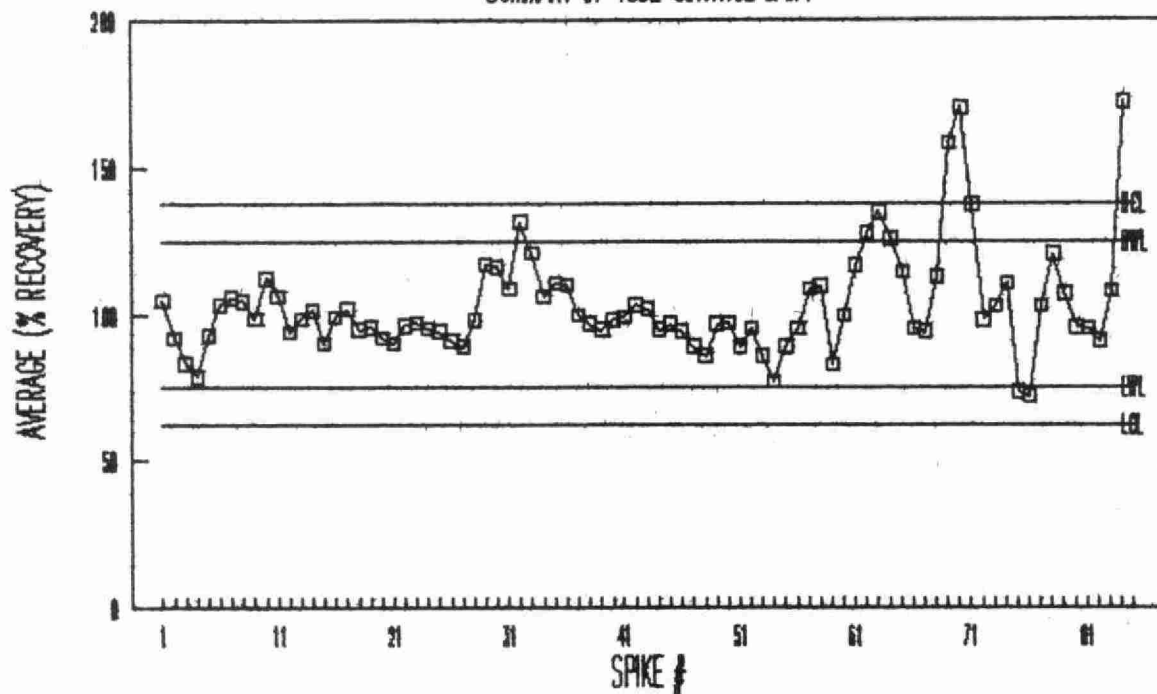
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SUMMARY OF 1992 CONTROL DATA



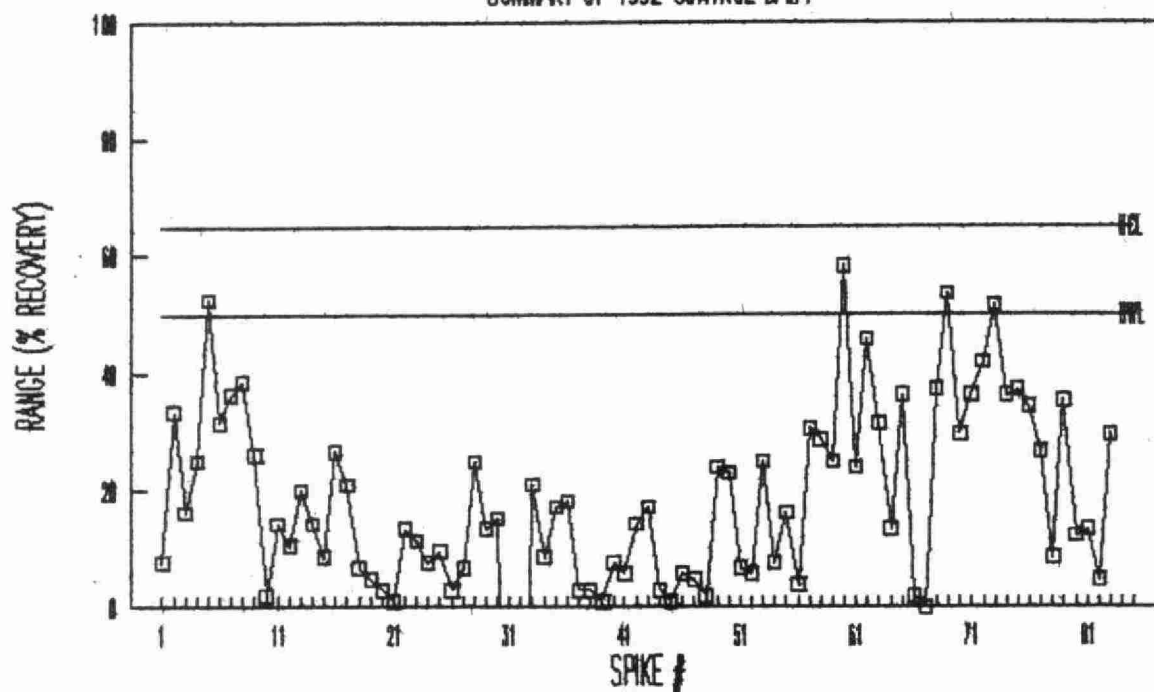
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SUMMARY OF 1992 CONTROL DATA



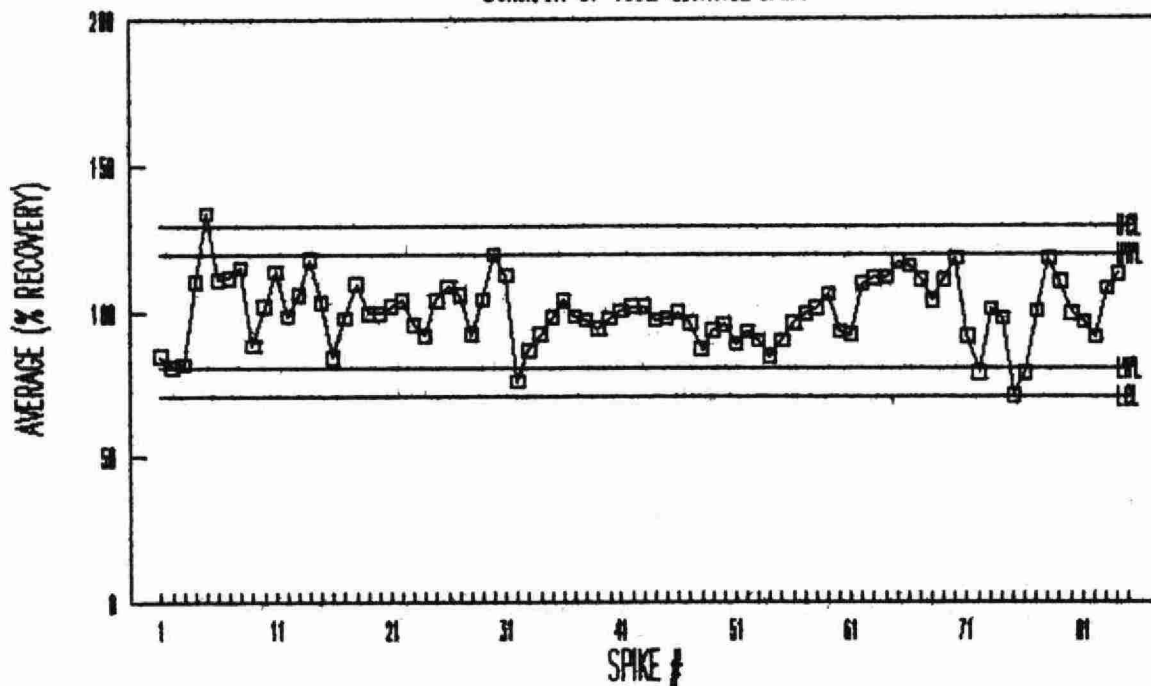
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SUMMARY OF 1992 CONTROL DATA



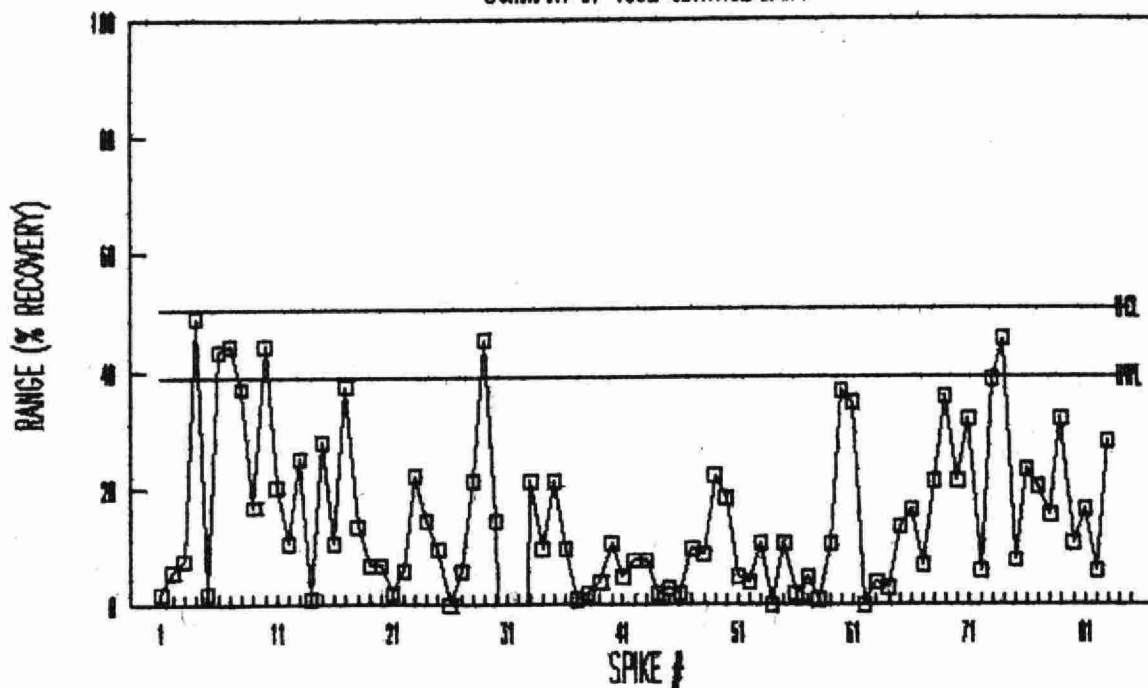
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SUMMARY OF 1992 CONTROL DATA



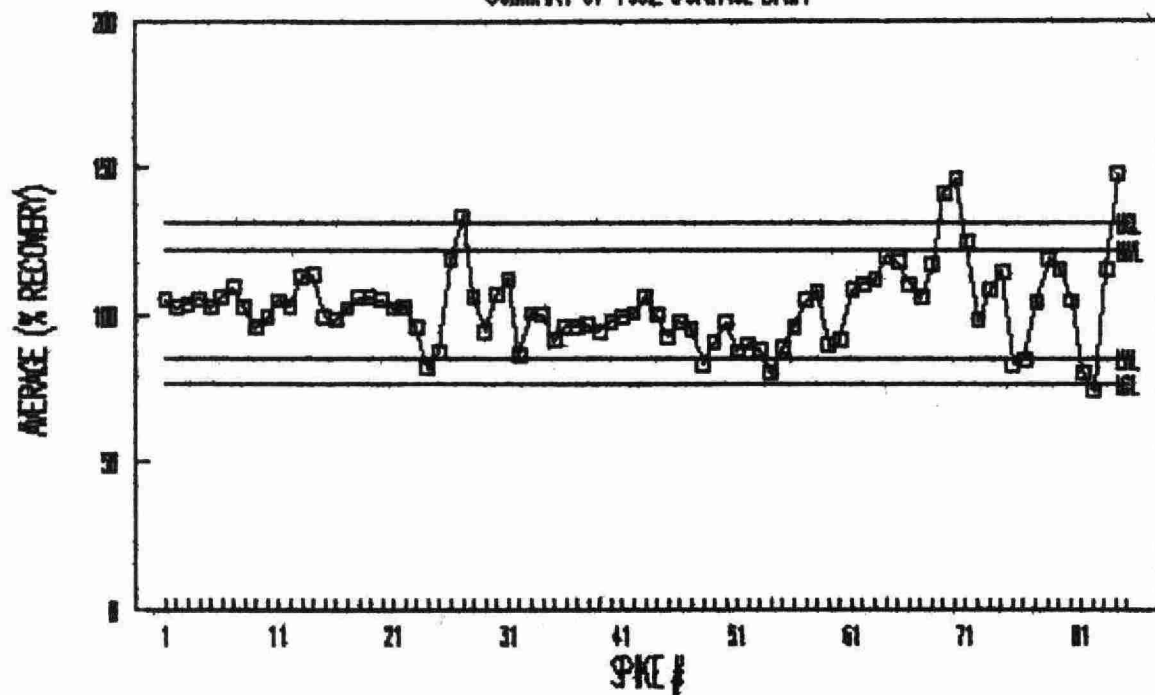
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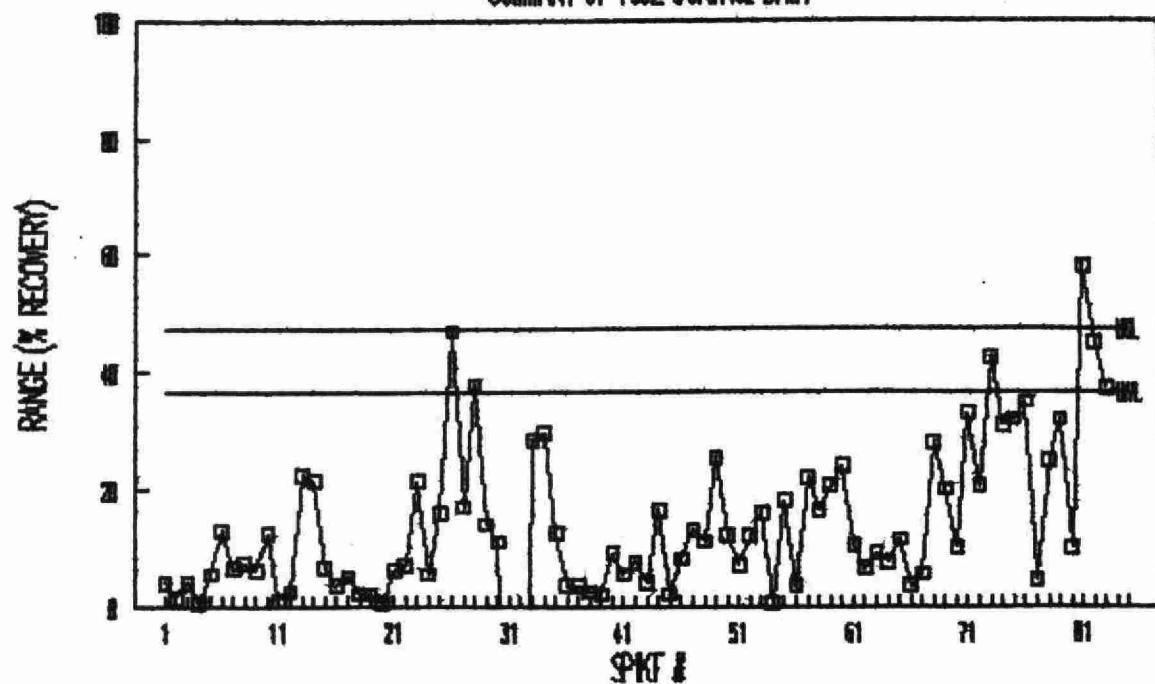
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SUMMARY OF 1992 CONTROL DATA



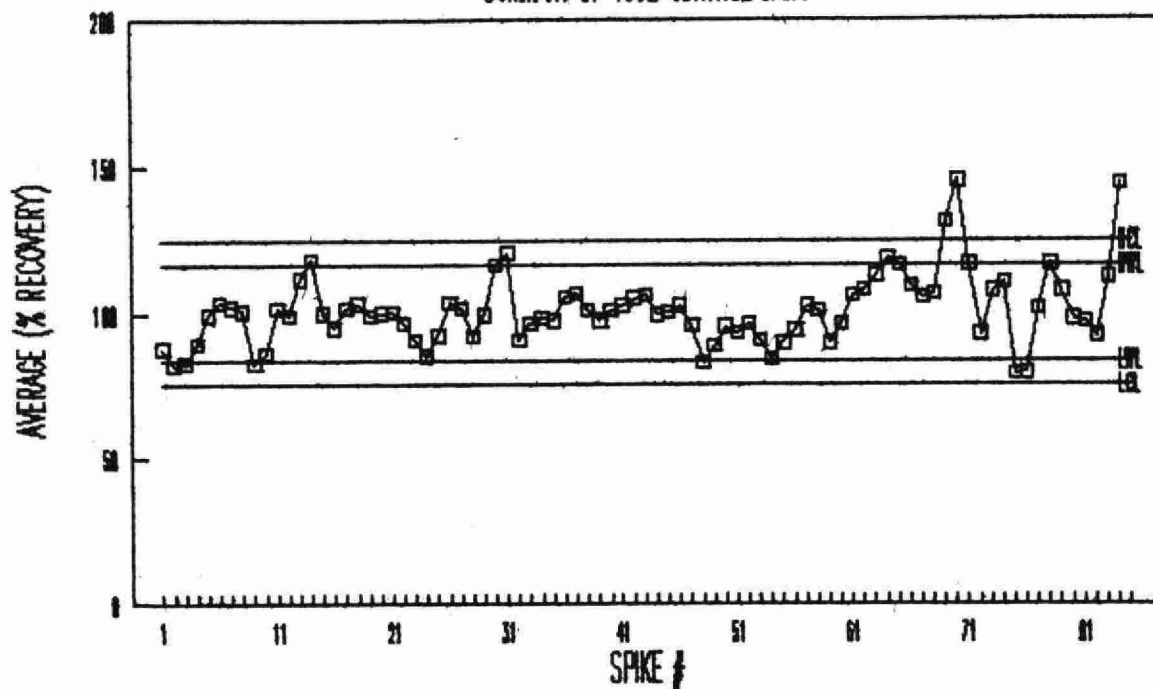
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SUMMARY OF 1992 CONTROL DATA



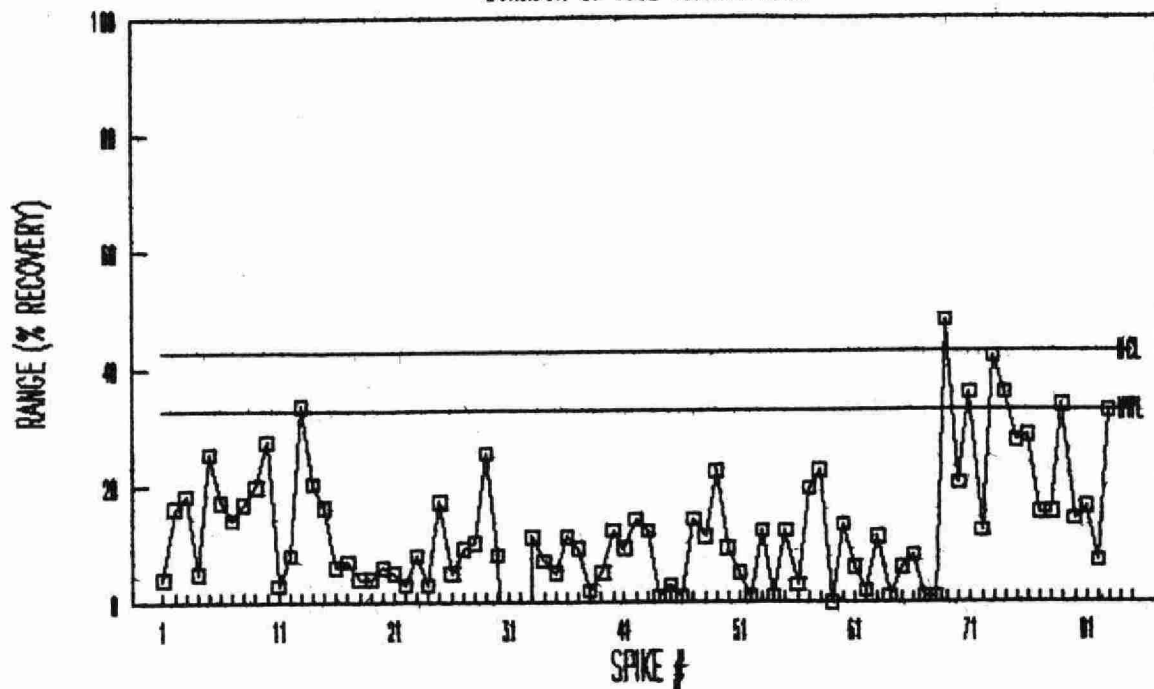
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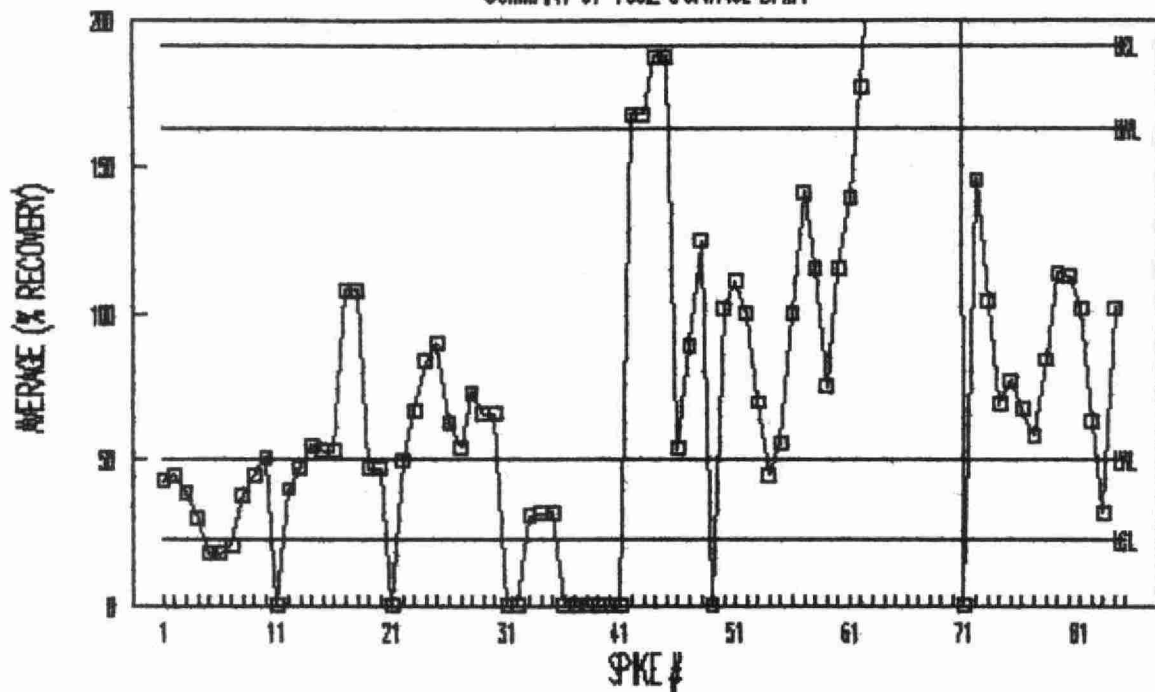
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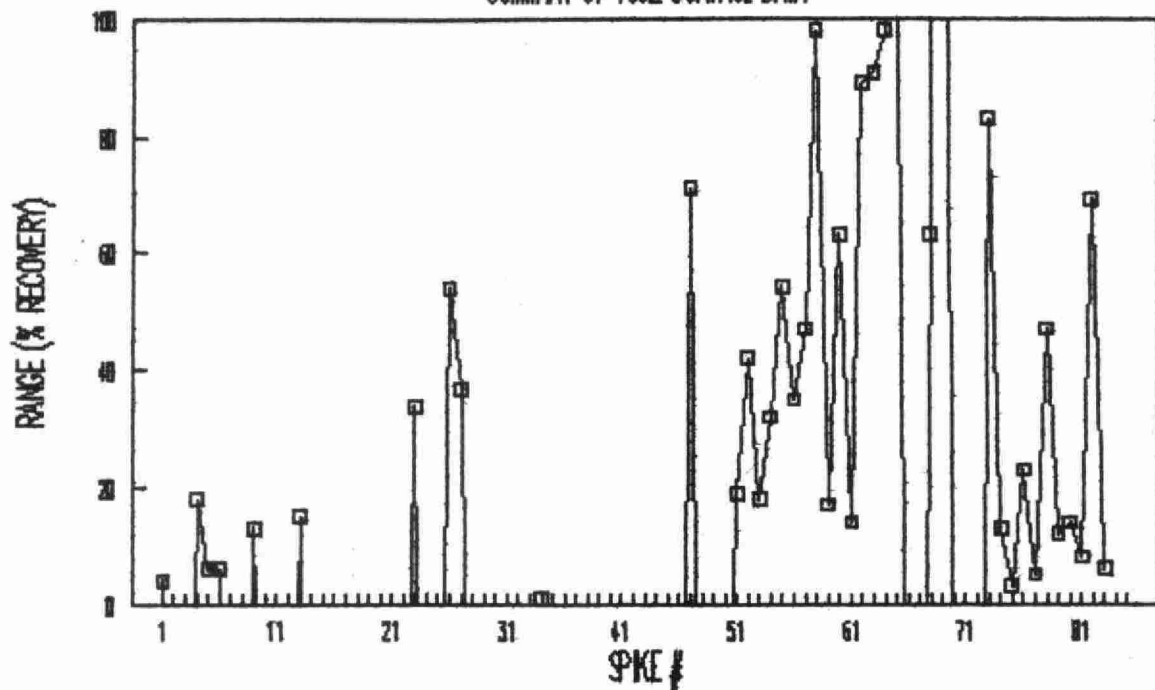
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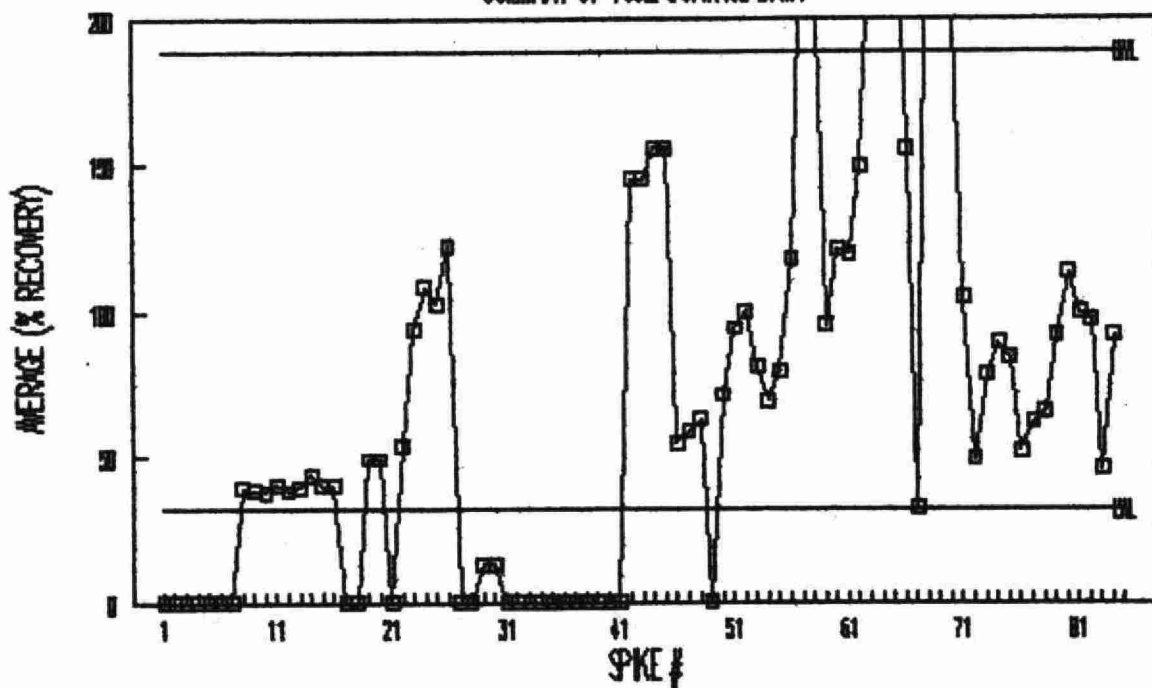
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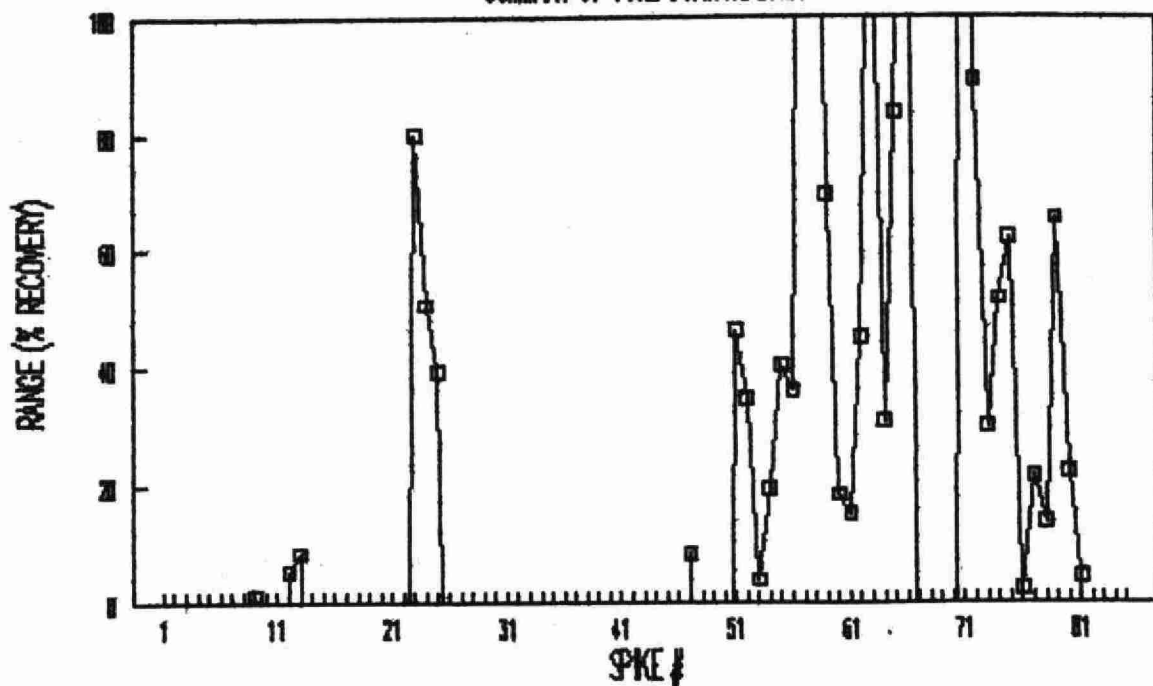
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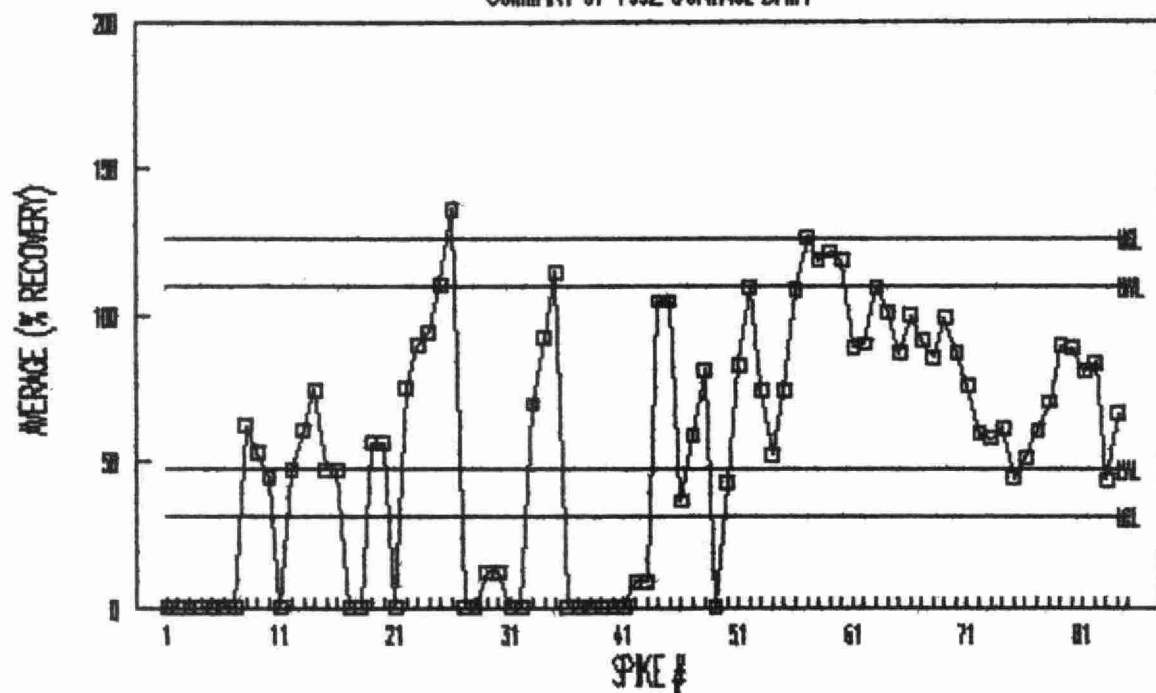
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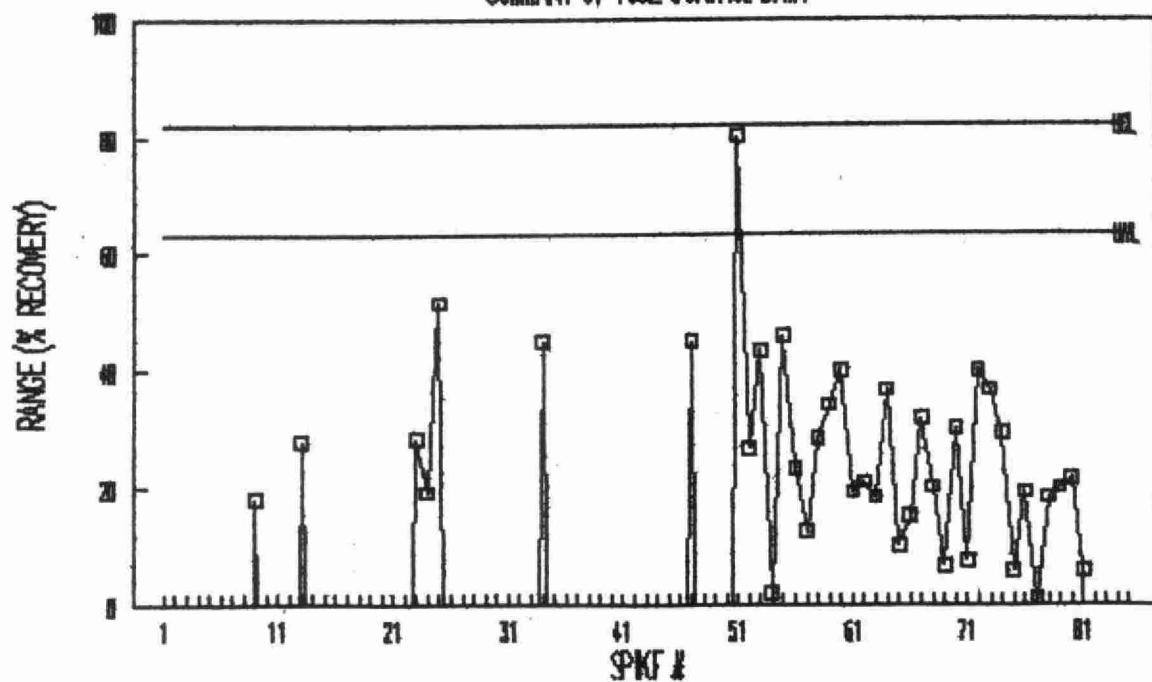
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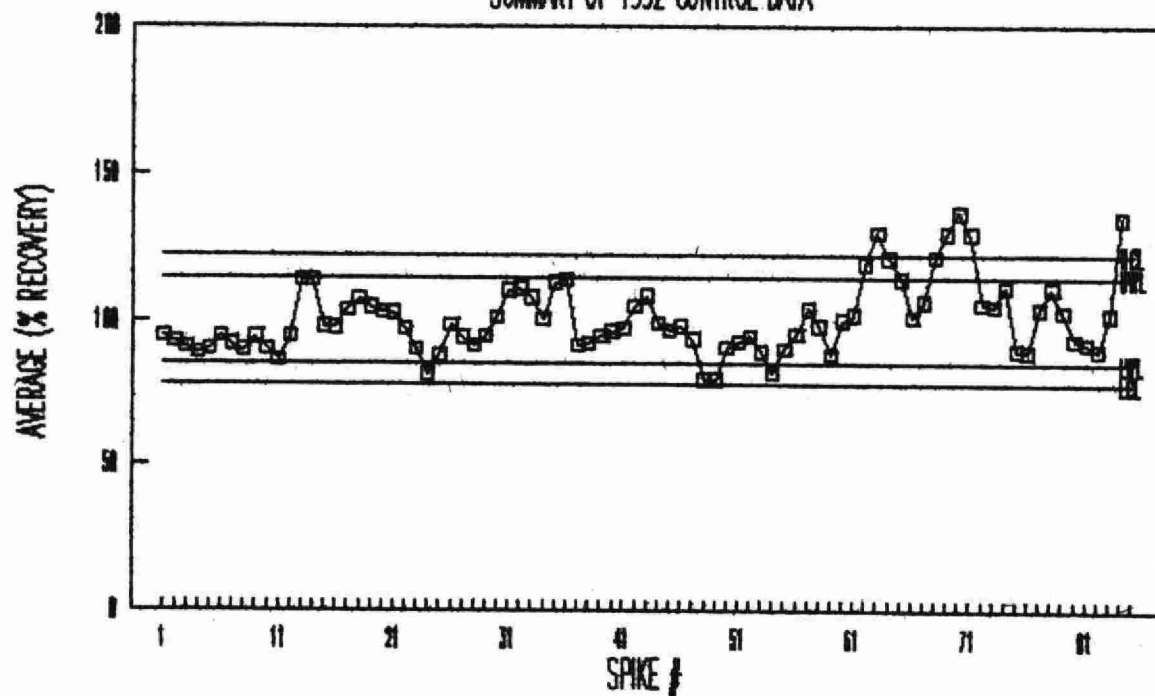
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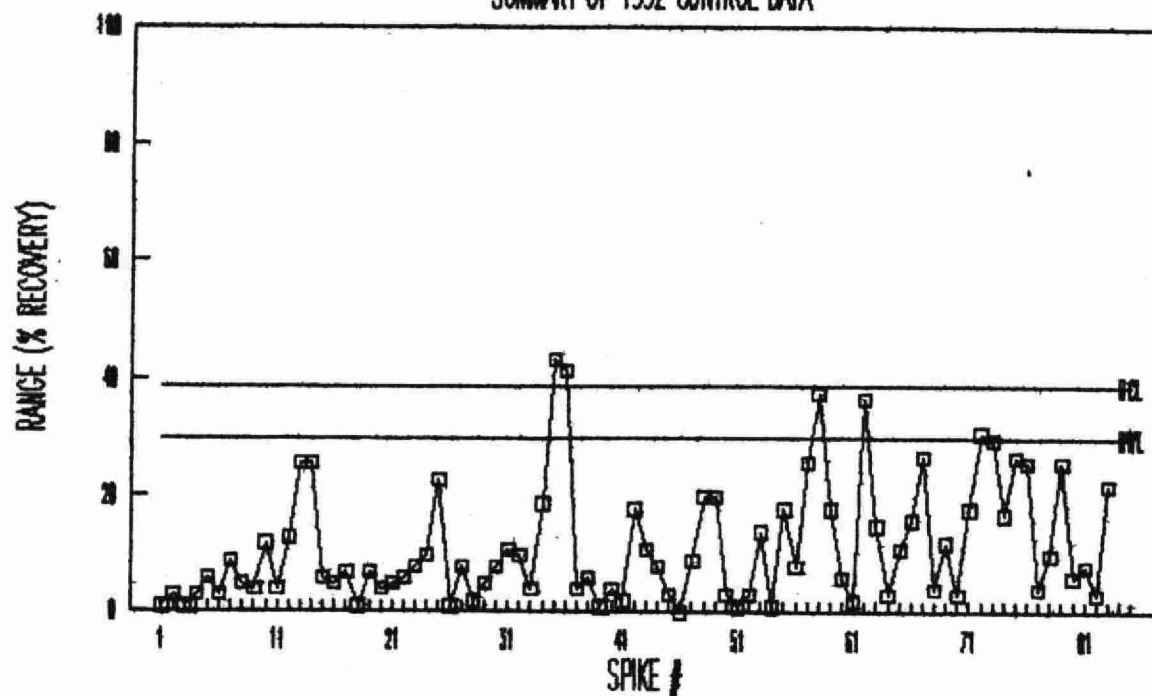
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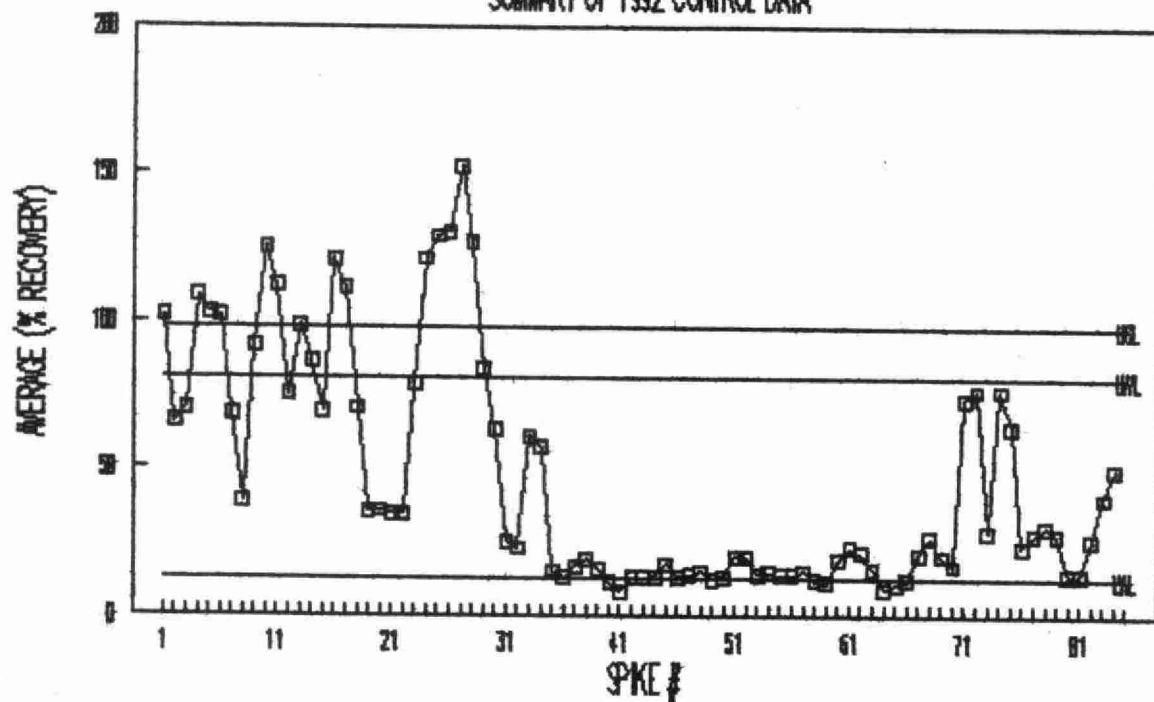
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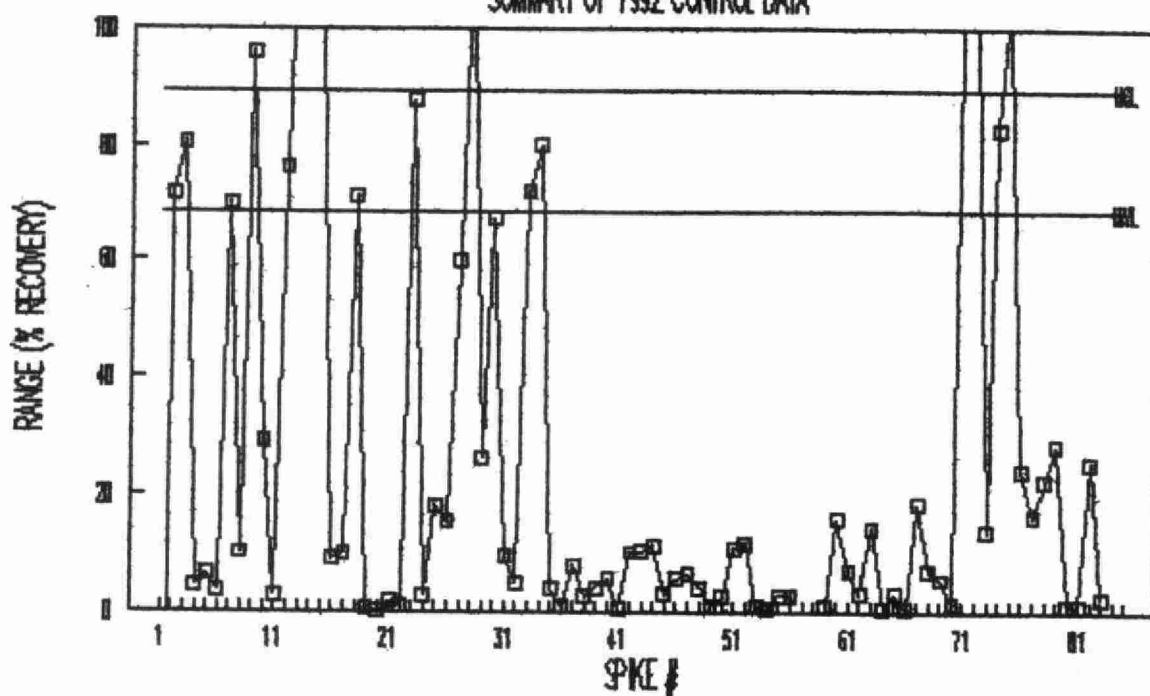
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SUMMARY OF 1992 CONTROL DATA

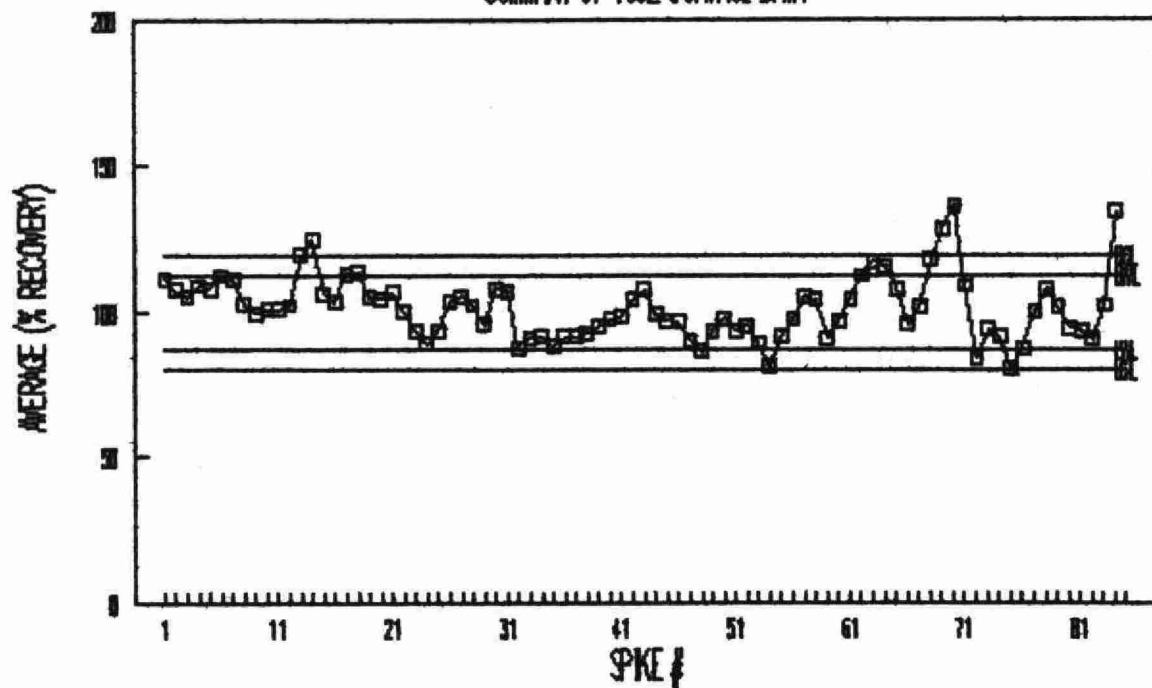


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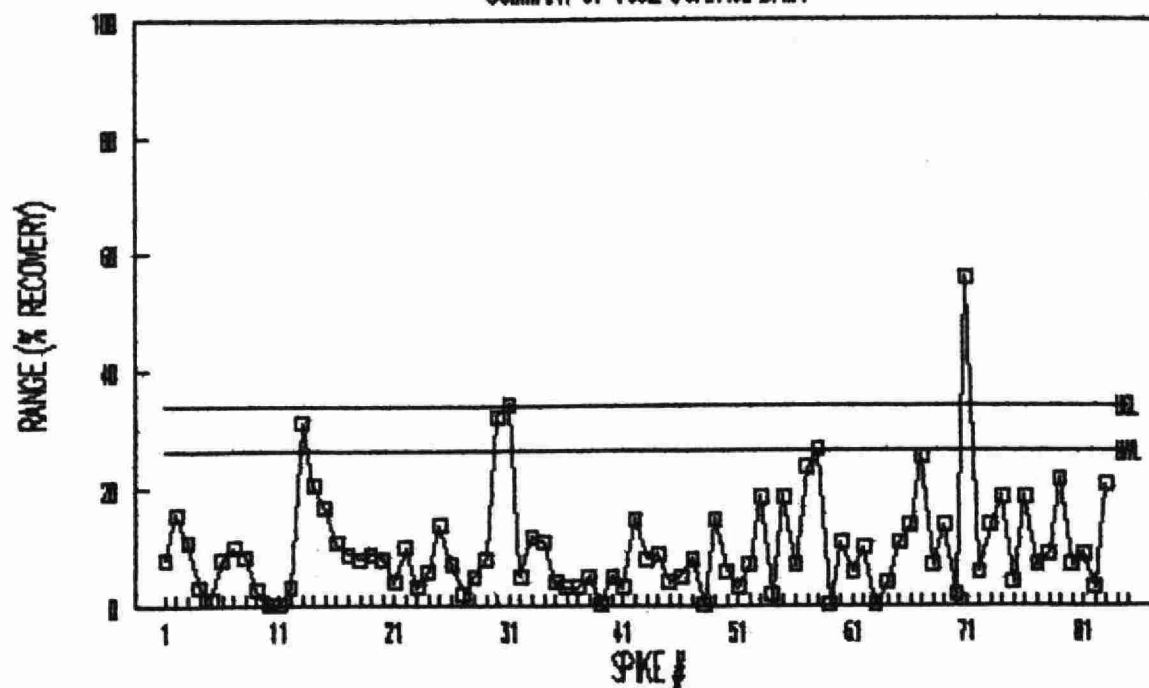
SUMMARY OF 1992 CONTROL DATA



MISA19/20:PNANTH
SUMMARY OF 1992 CONTROL DATA

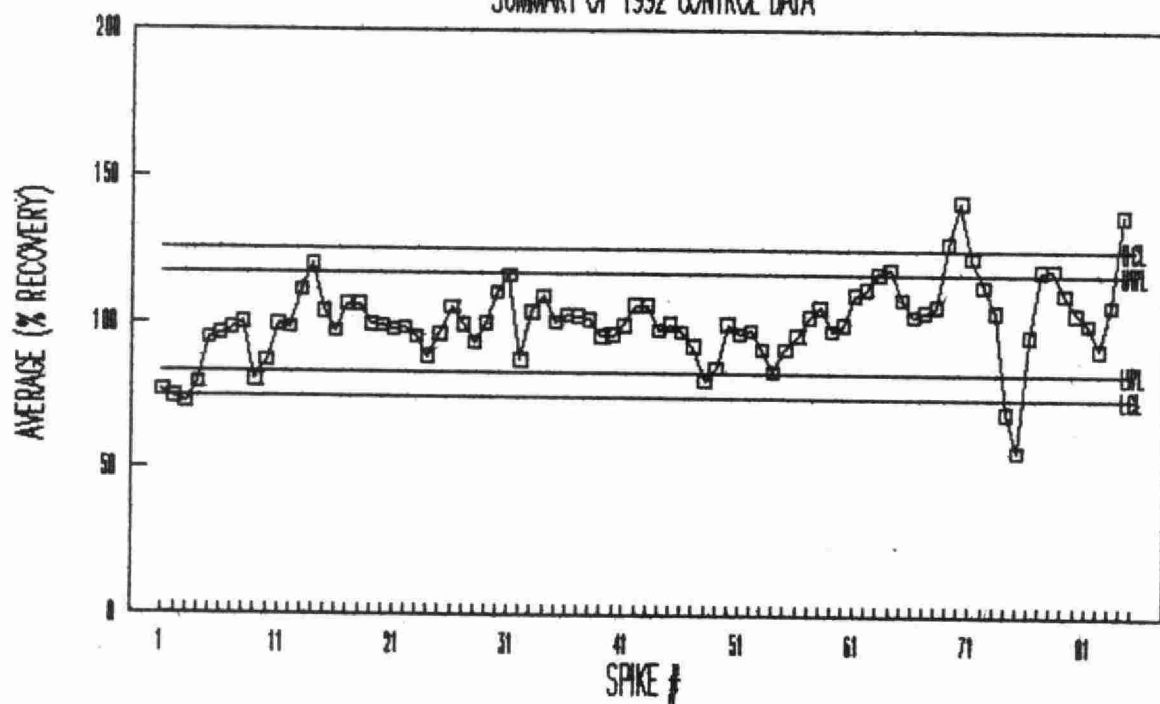


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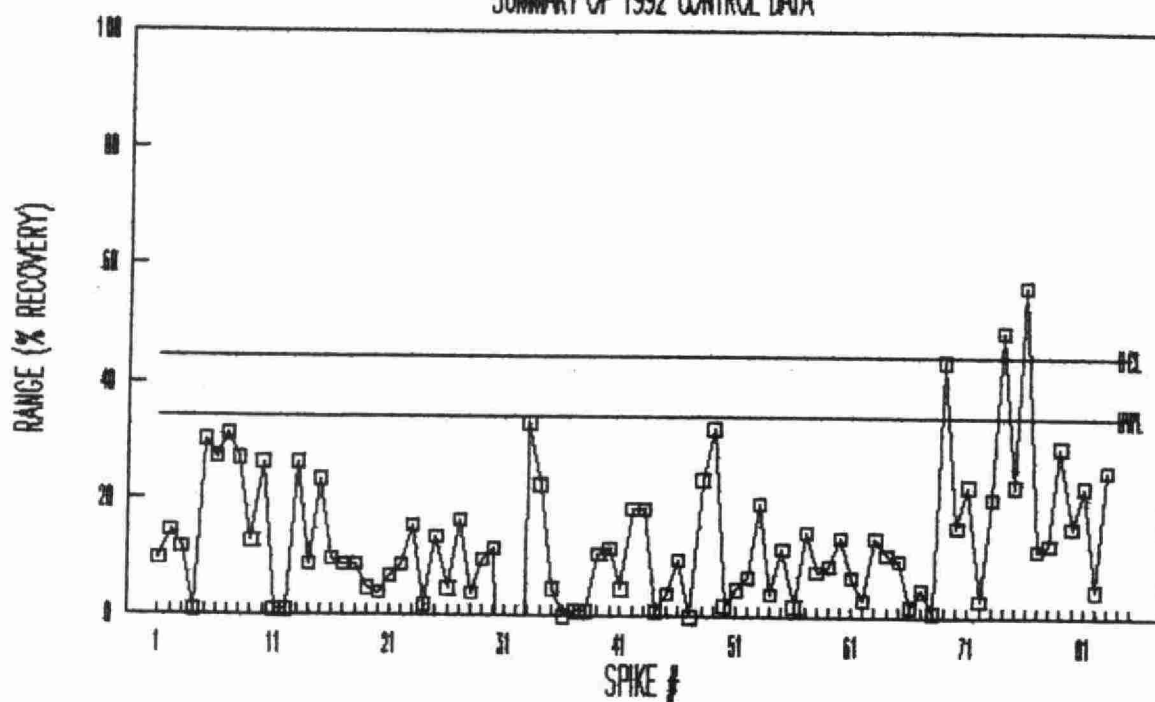
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SUMMARY OF 1992 CONTROL DATA



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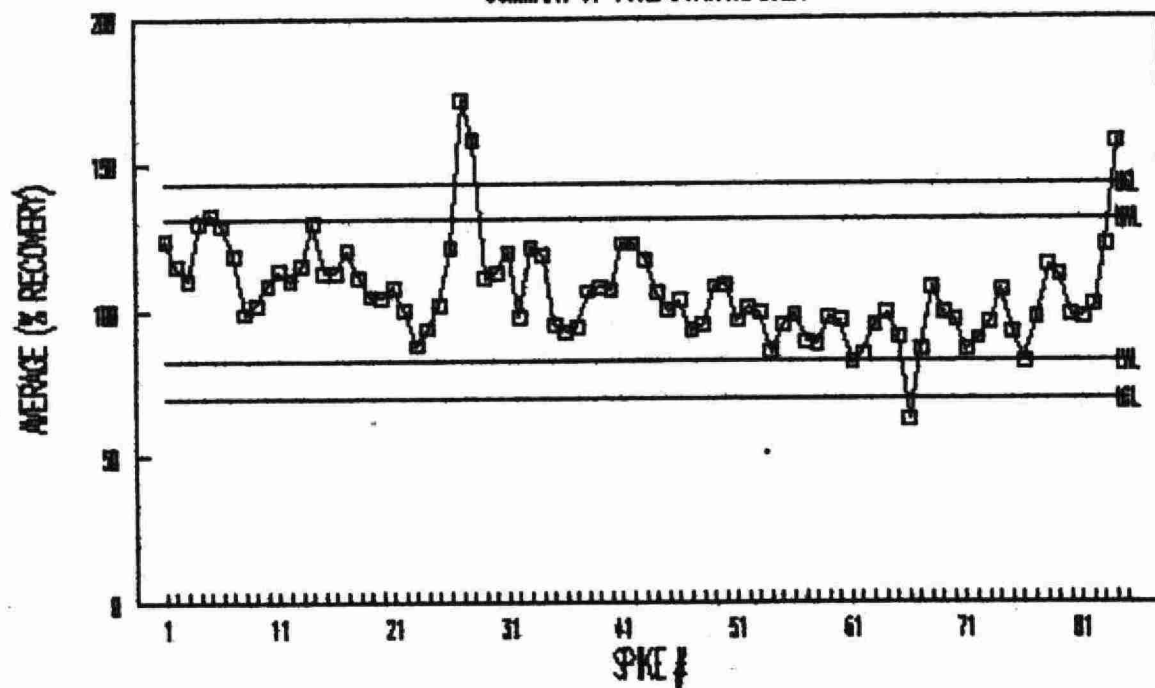
SUMMARY OF 1992 CONTROL DATA



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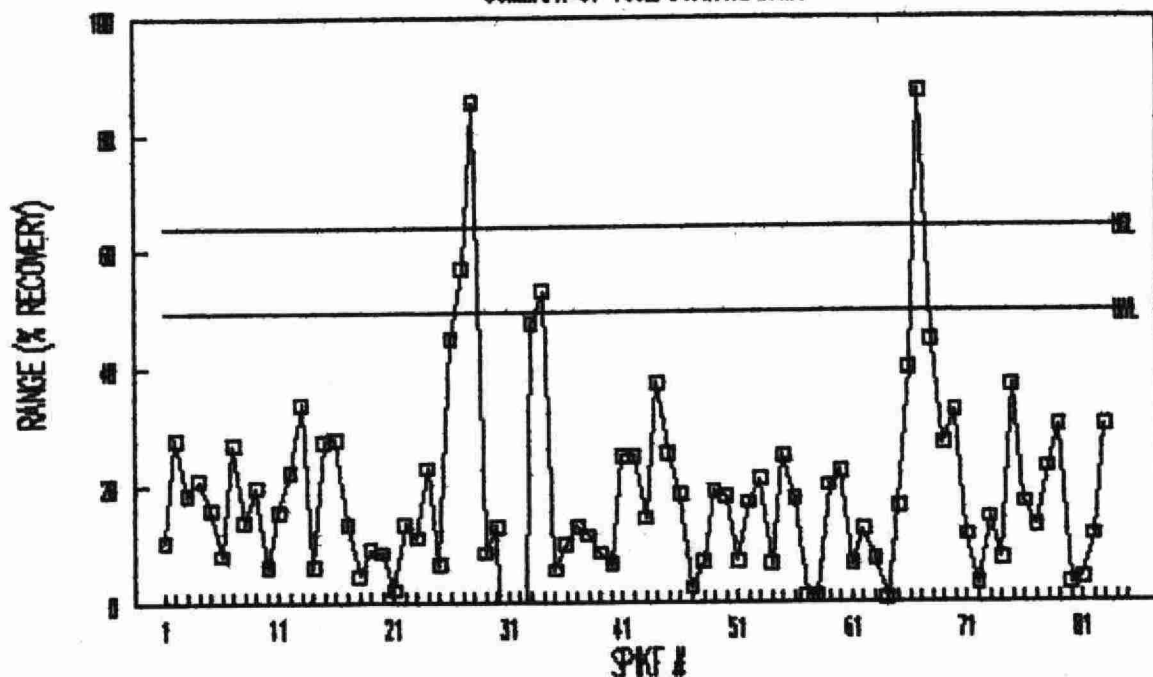
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SUMMARY OF 1992 CONTROL DATA



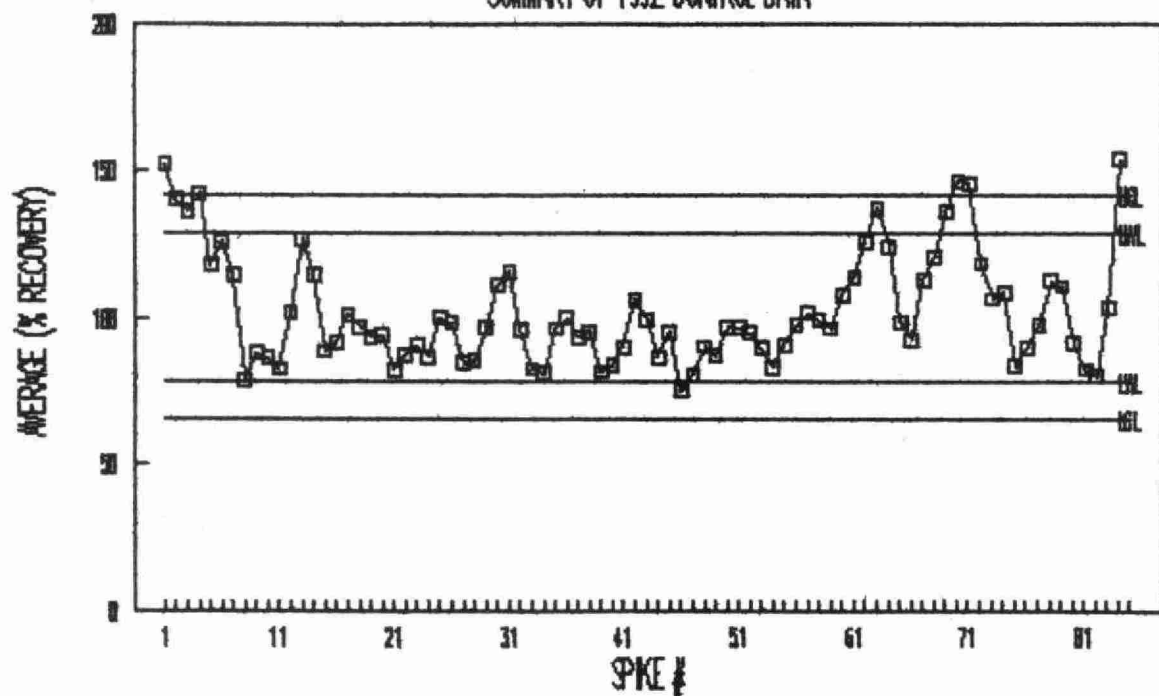
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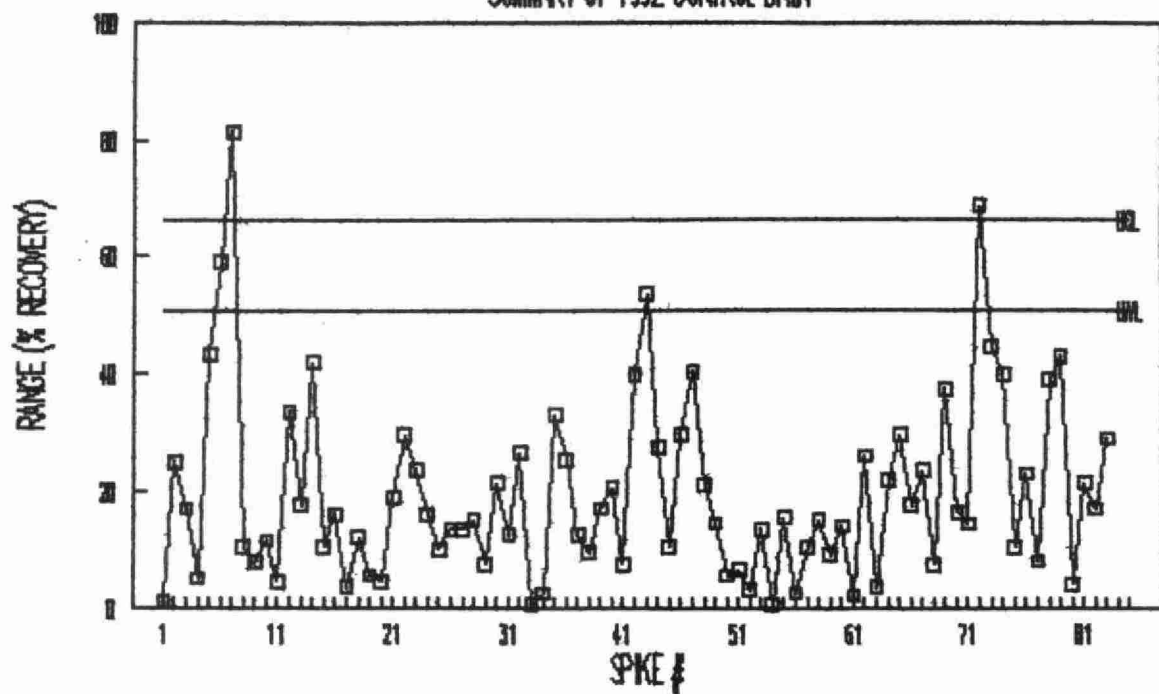
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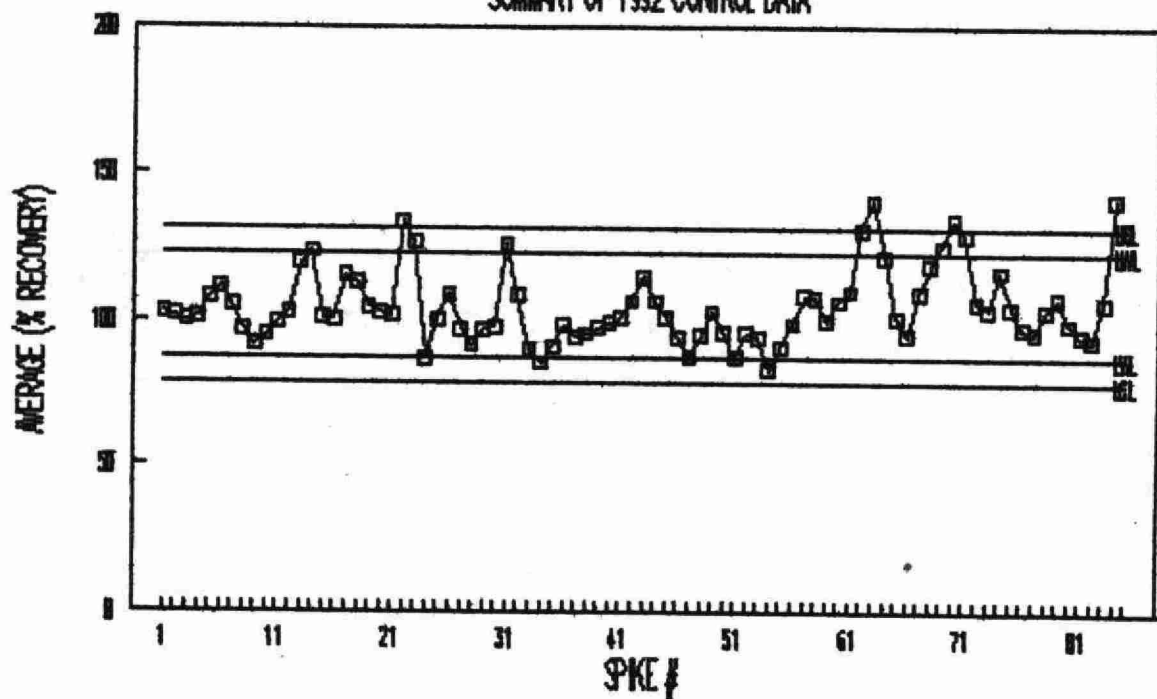
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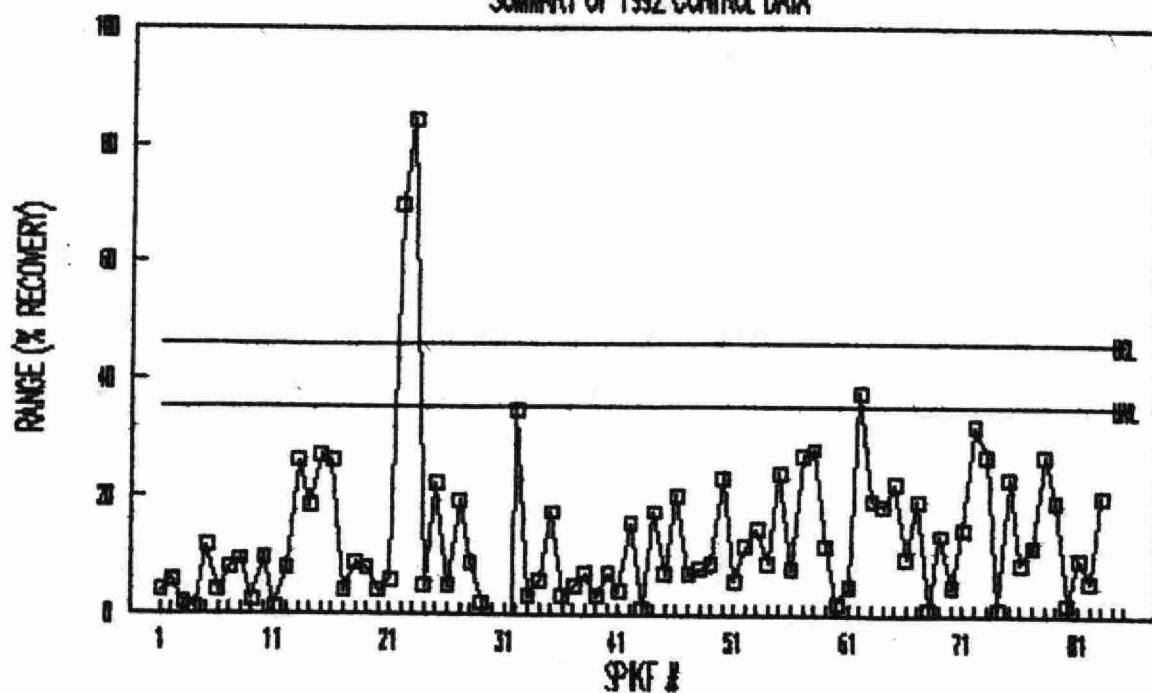
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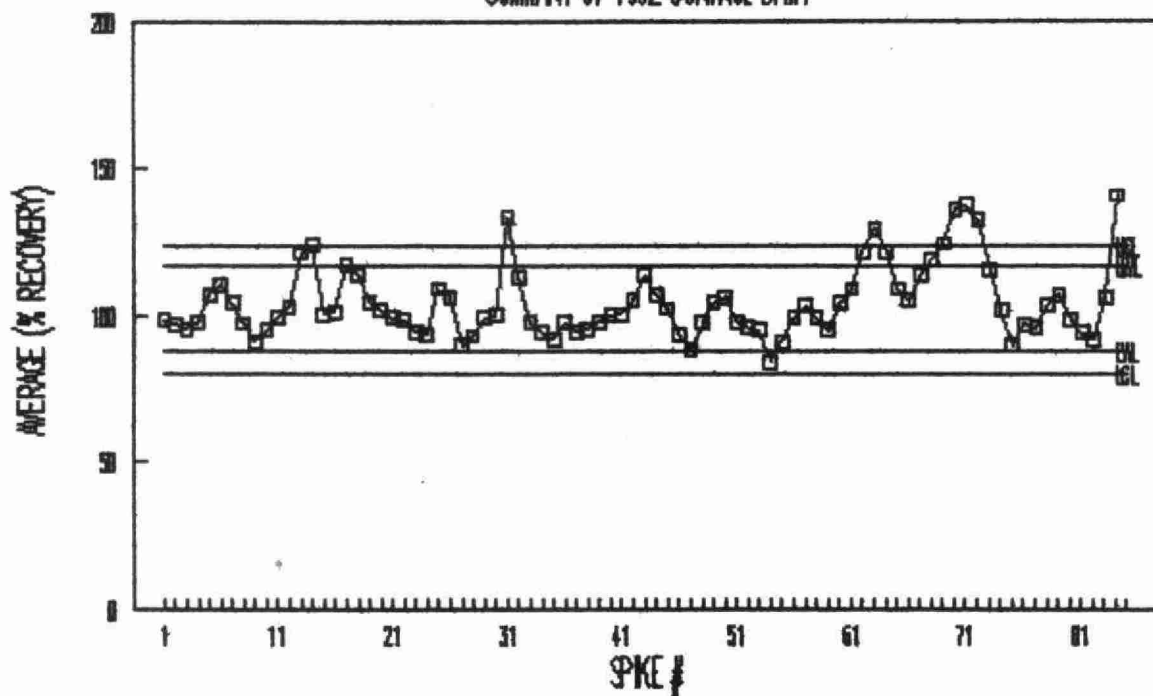
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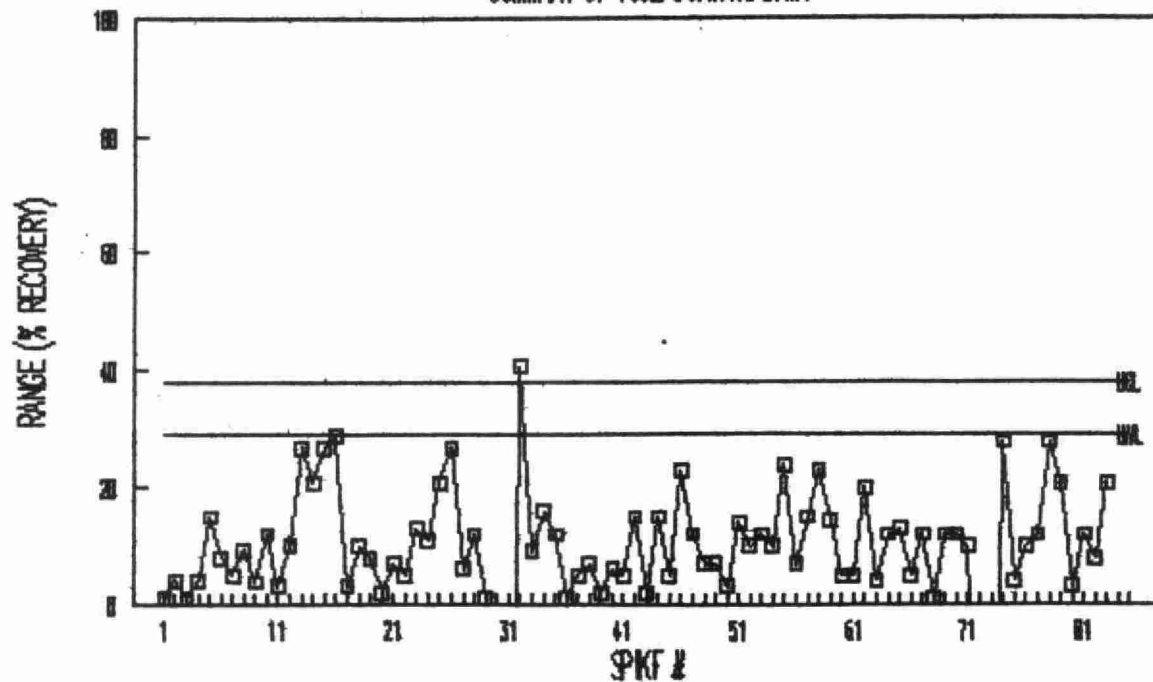
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SUMMARY OF 1992 CONTROL DATA



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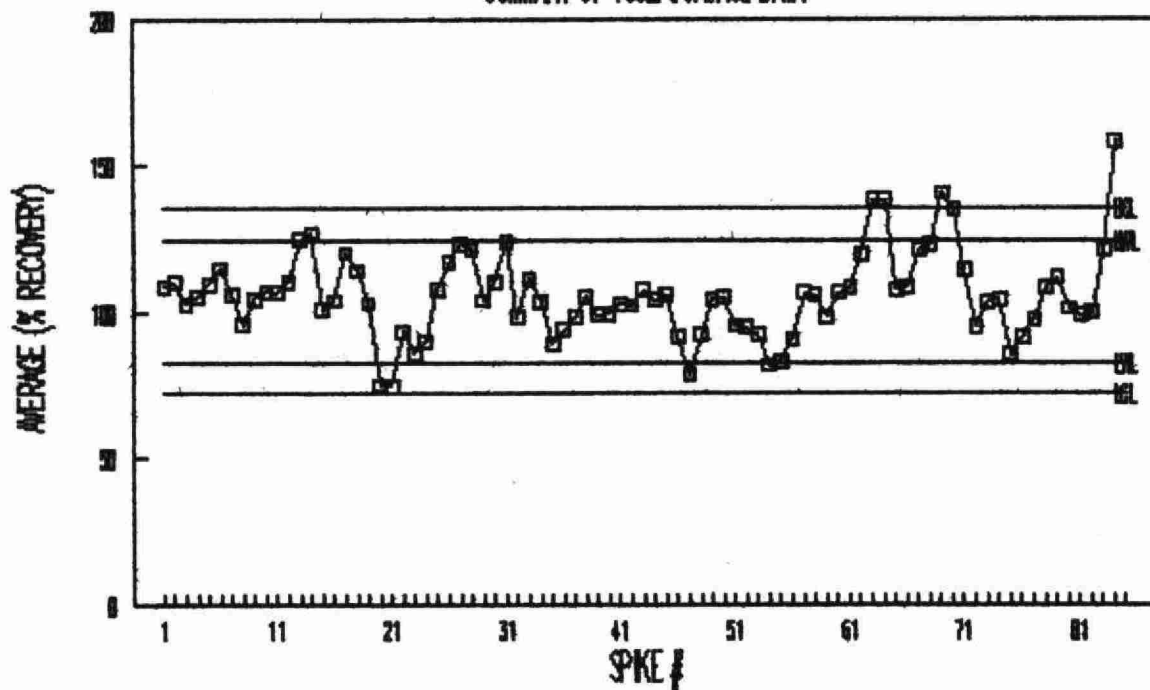
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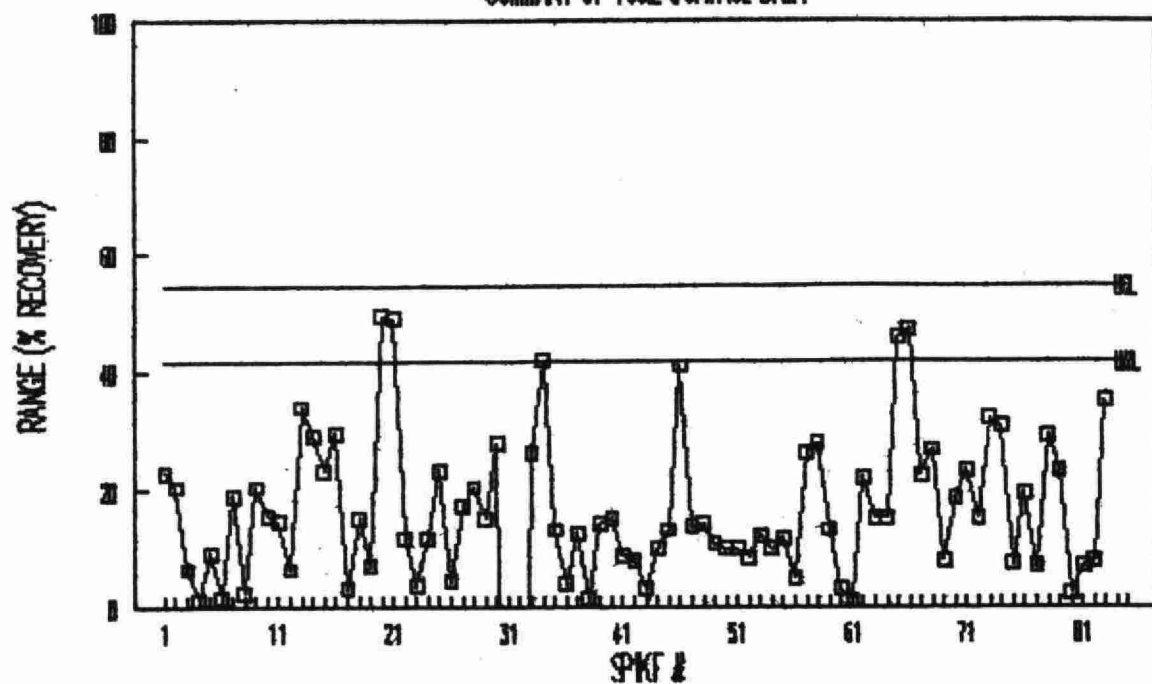
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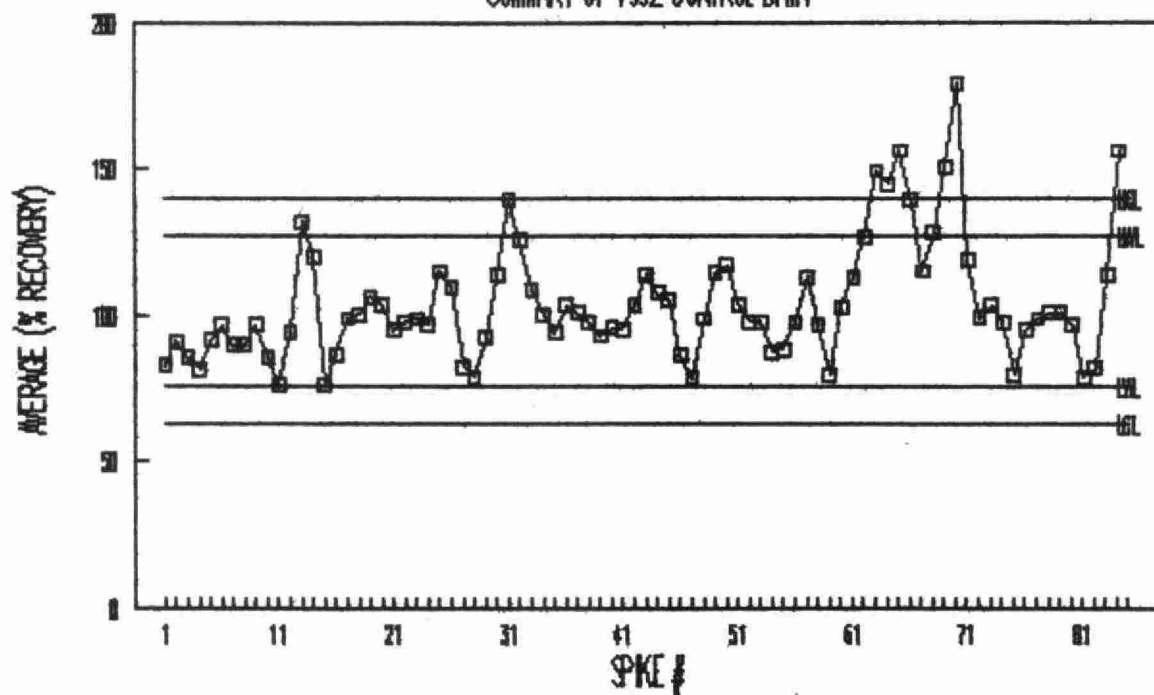
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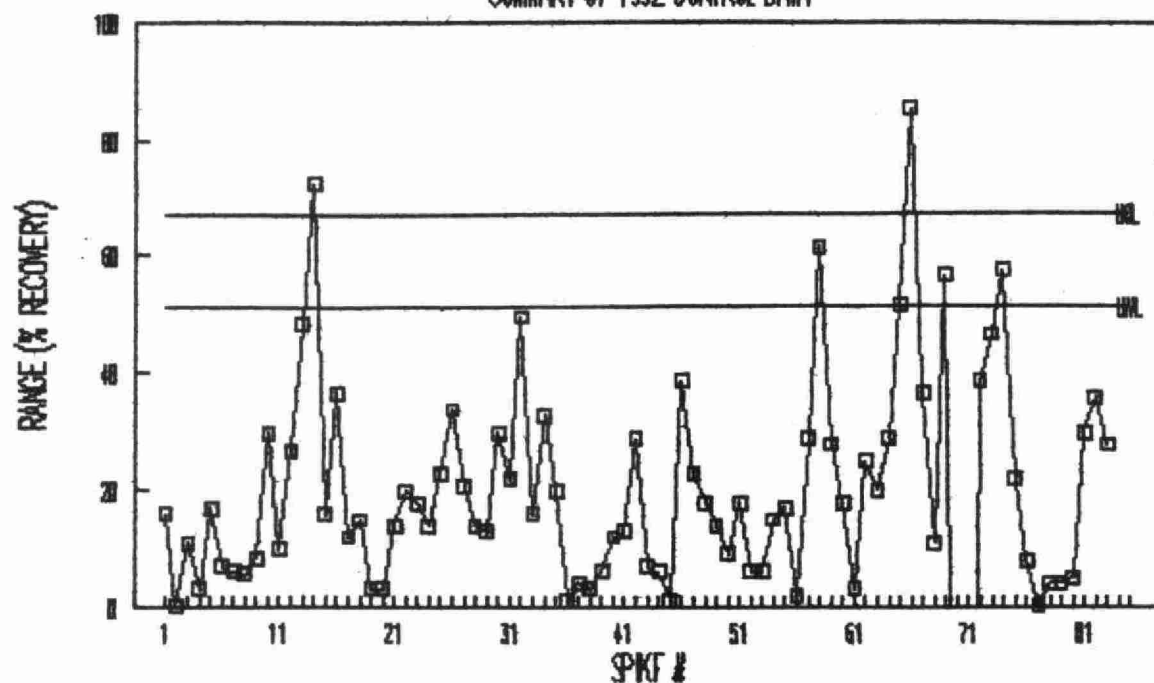
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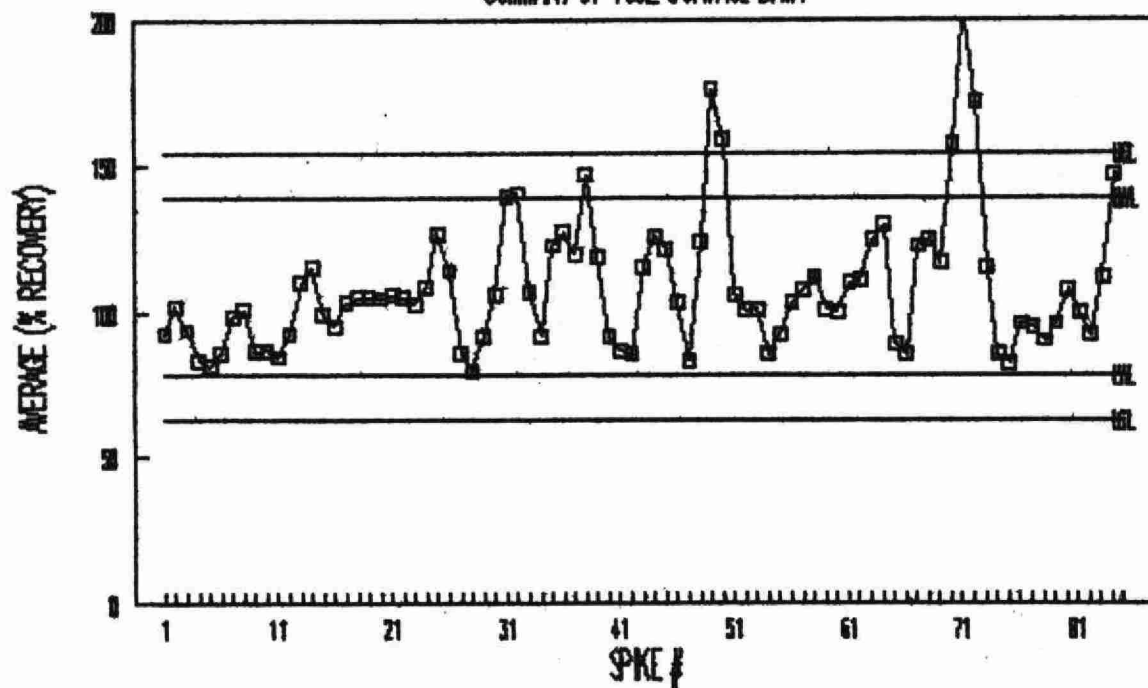
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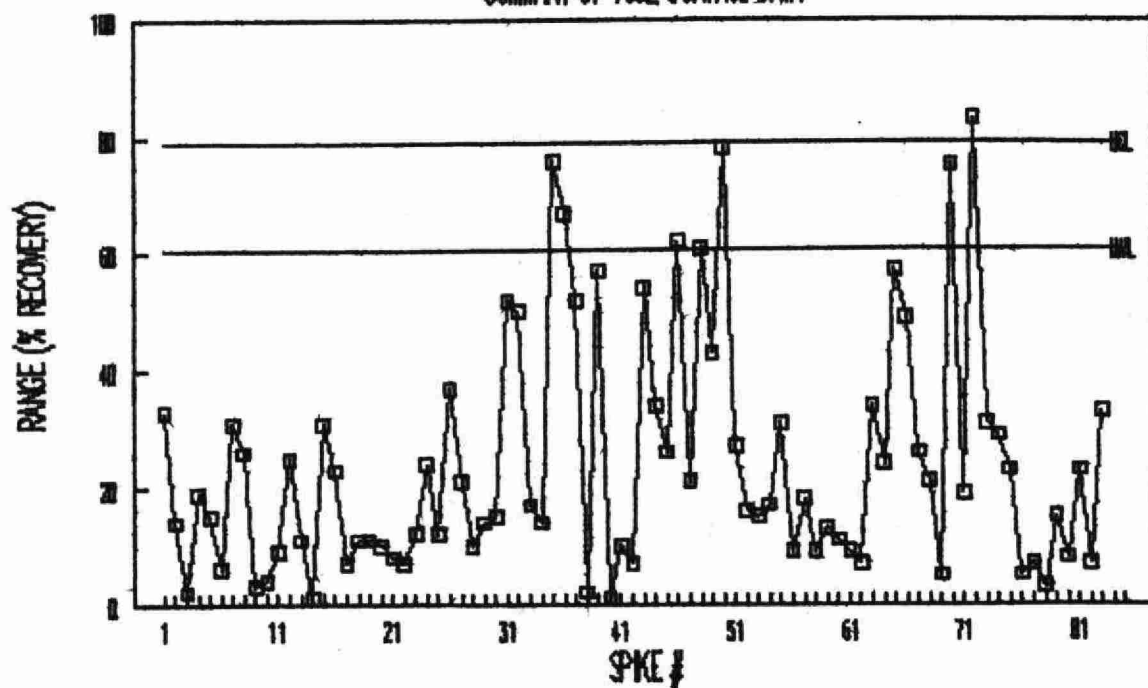
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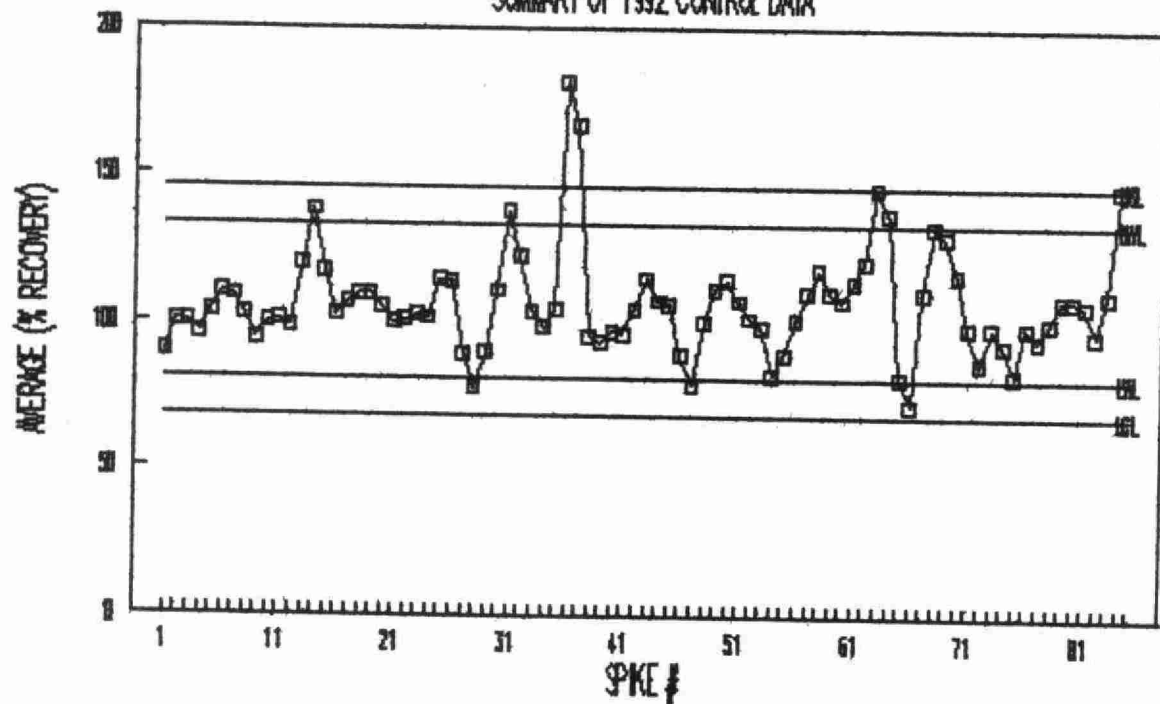
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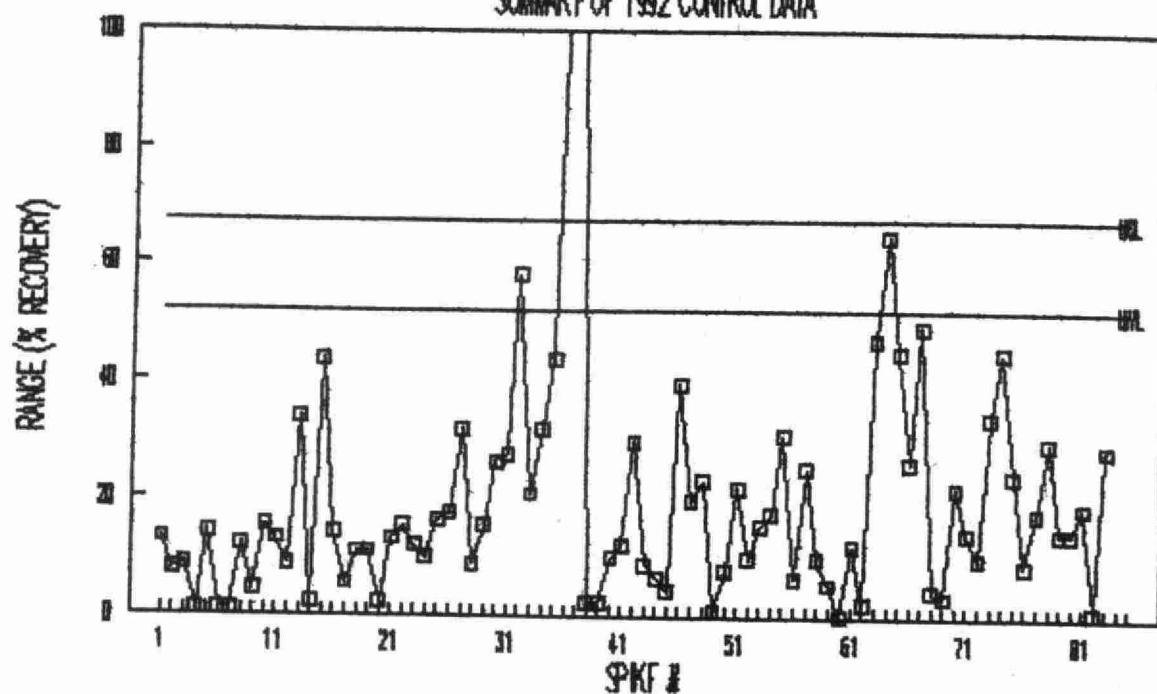
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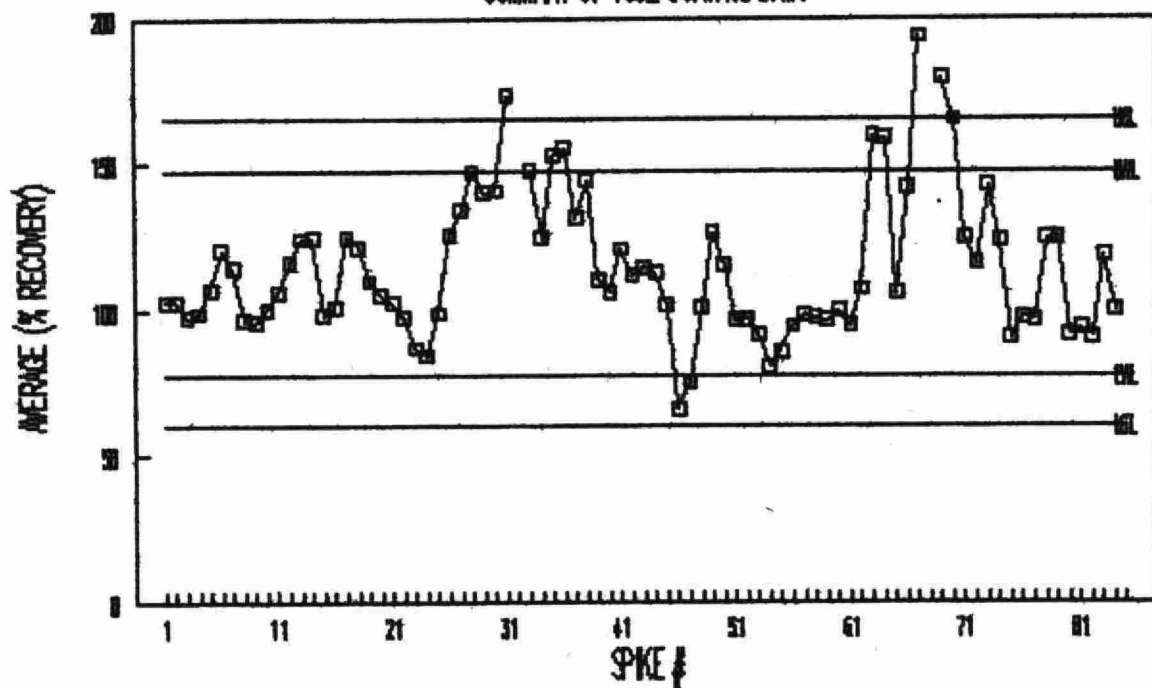
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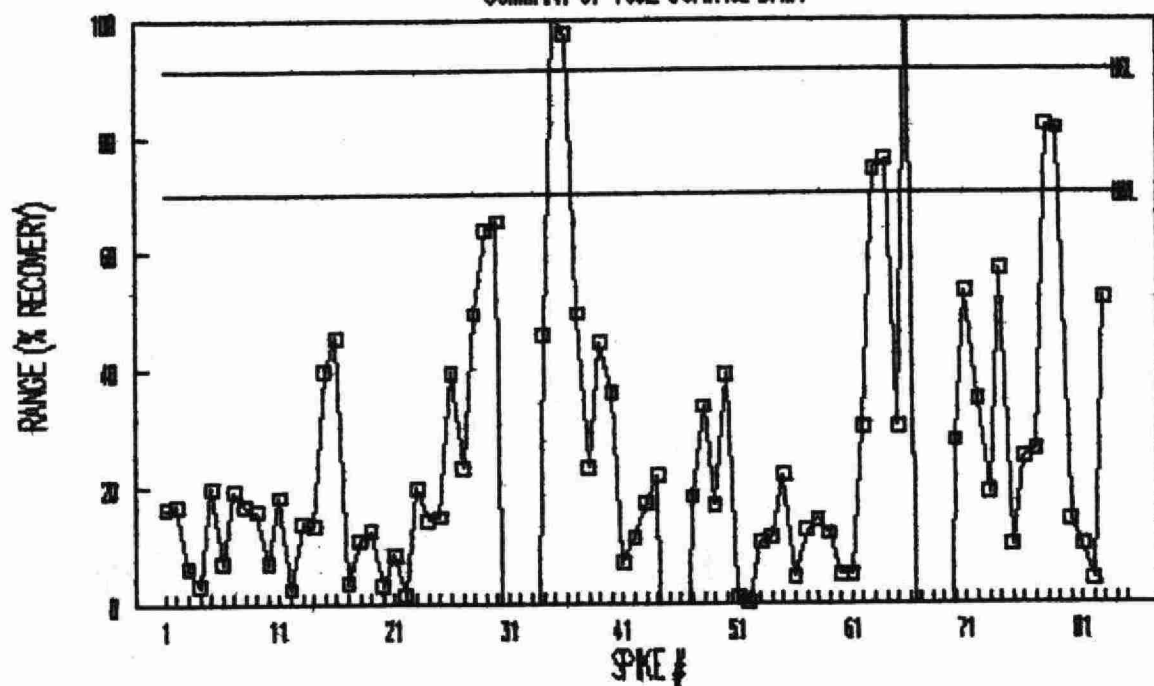
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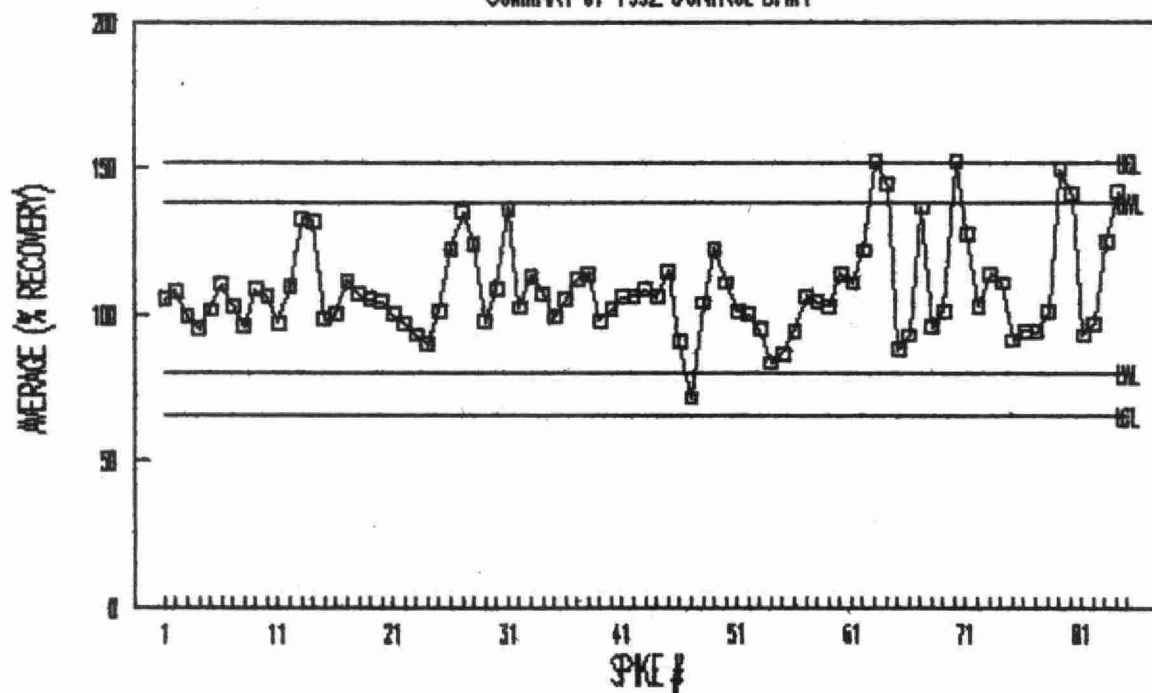
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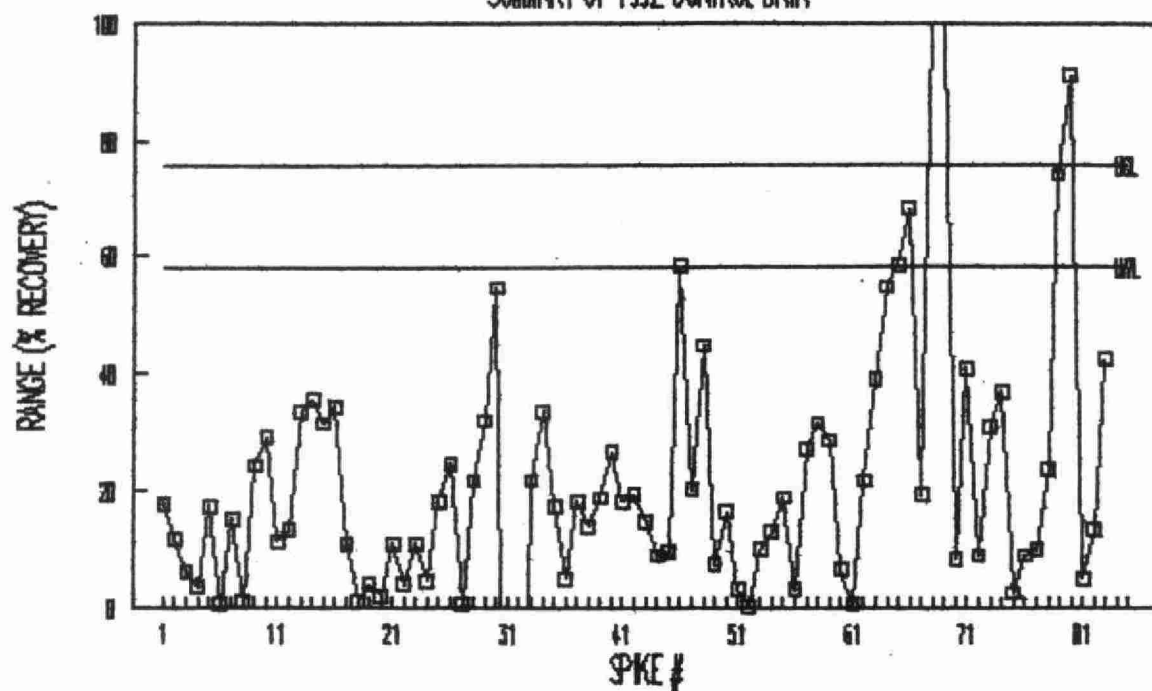
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SUMMARY OF 1992 CONTROL DATA



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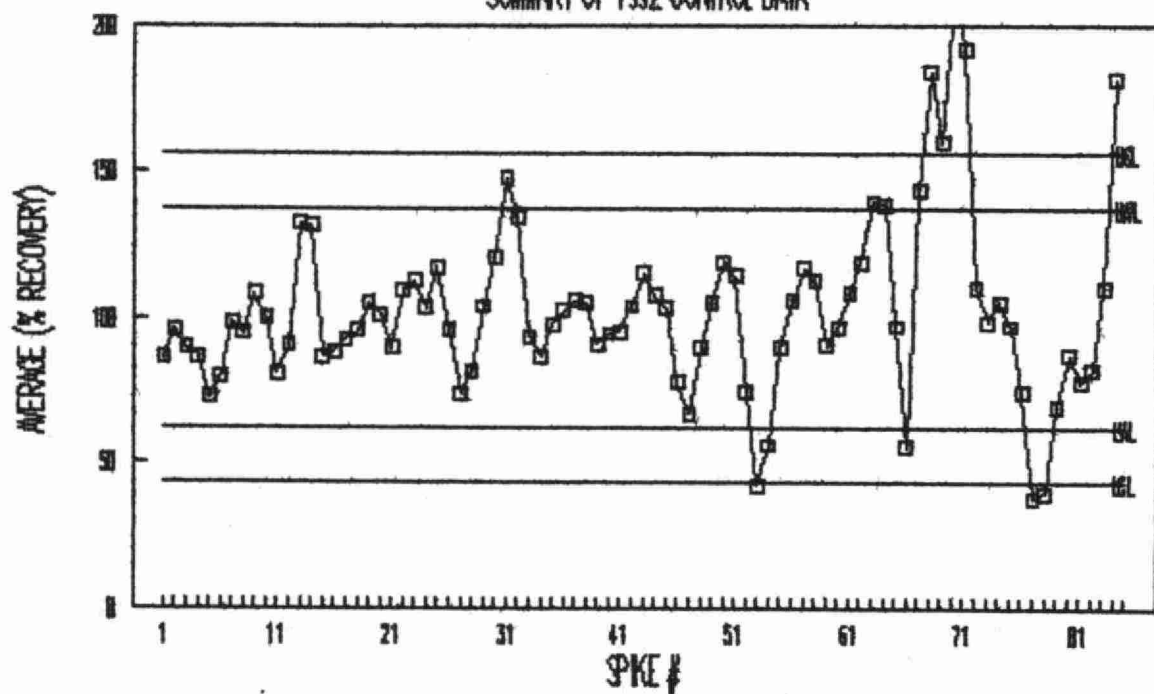
SUMMARY OF 1992 CONTROL DATA



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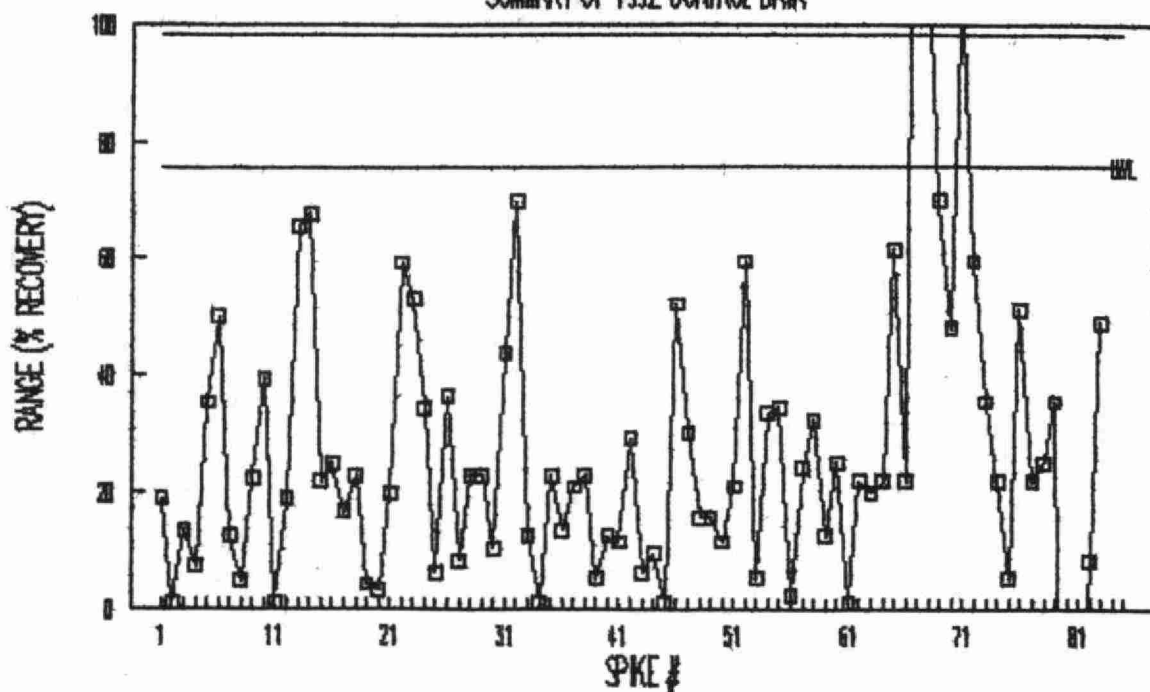
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SUMMARY OF 1992 CONTROL DATA



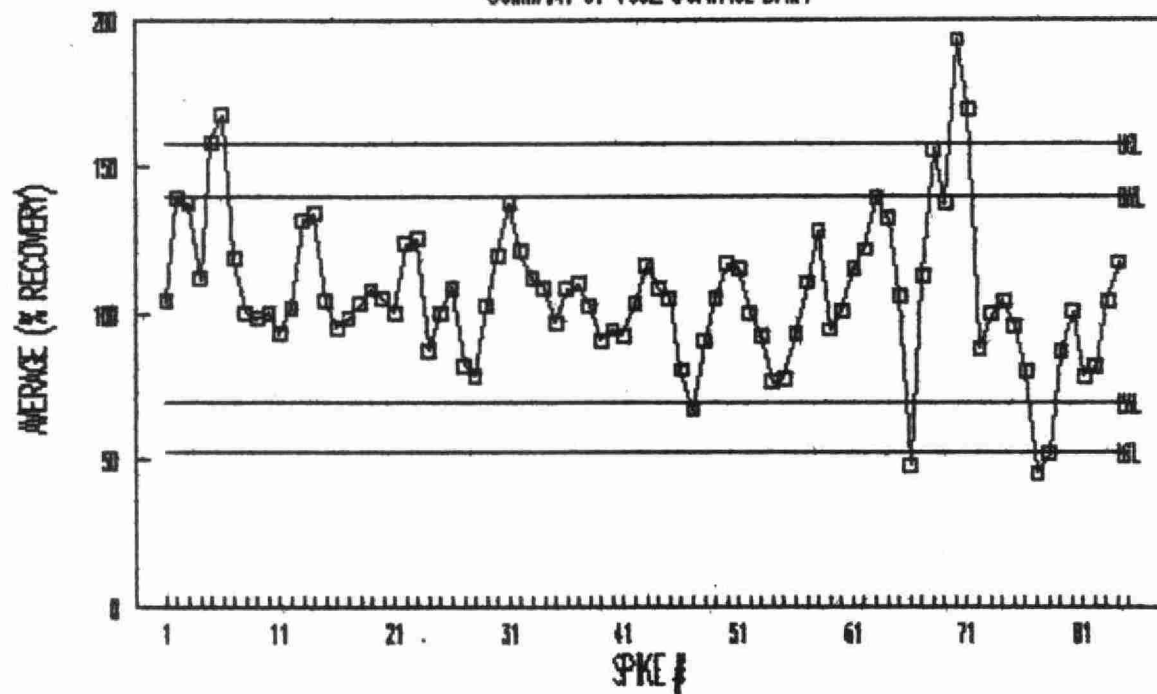
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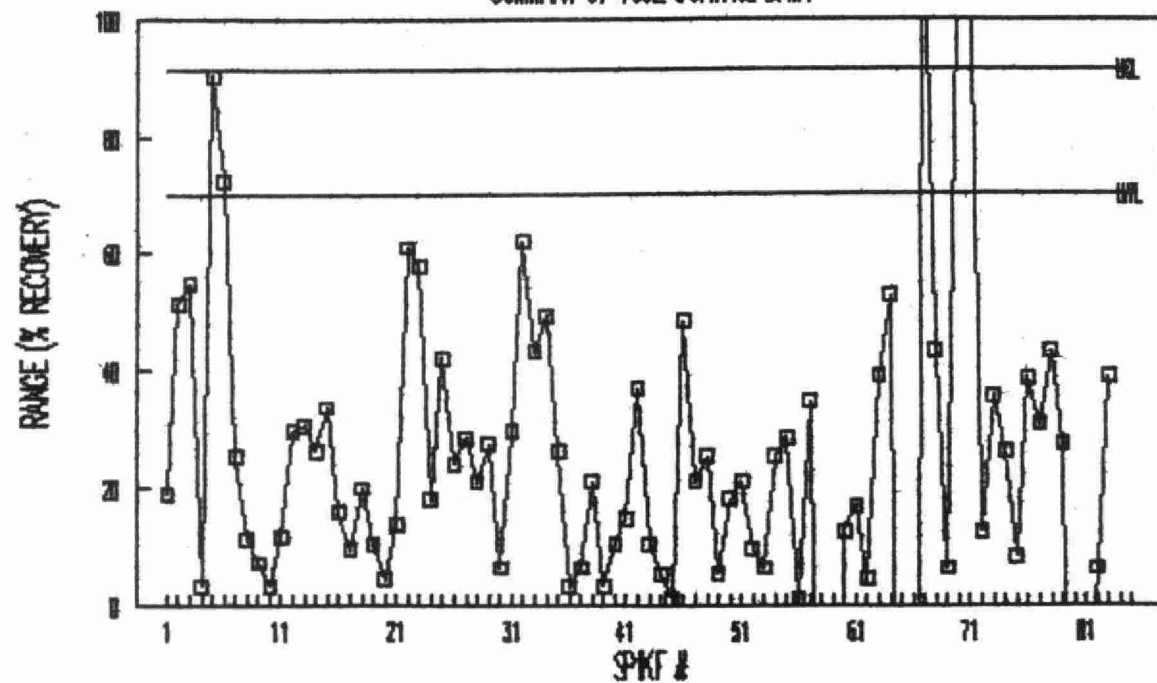
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SUMMARY OF 1992 CONTROL DATA



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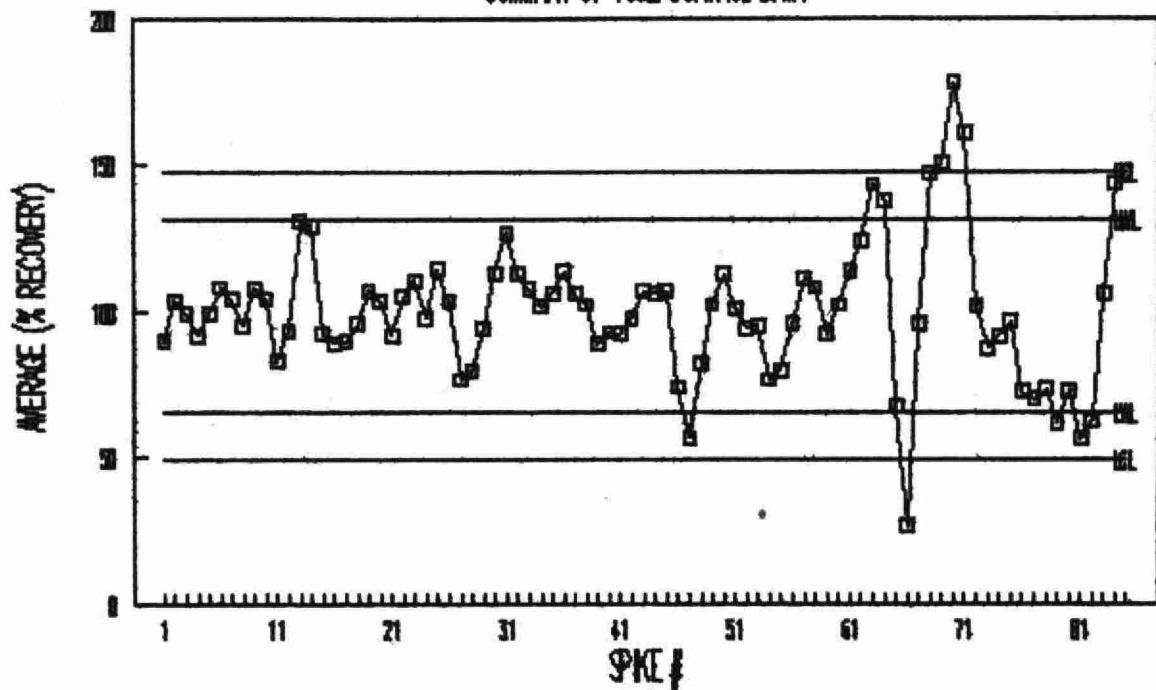
SUMMARY OF 1992 CONTROL DATA



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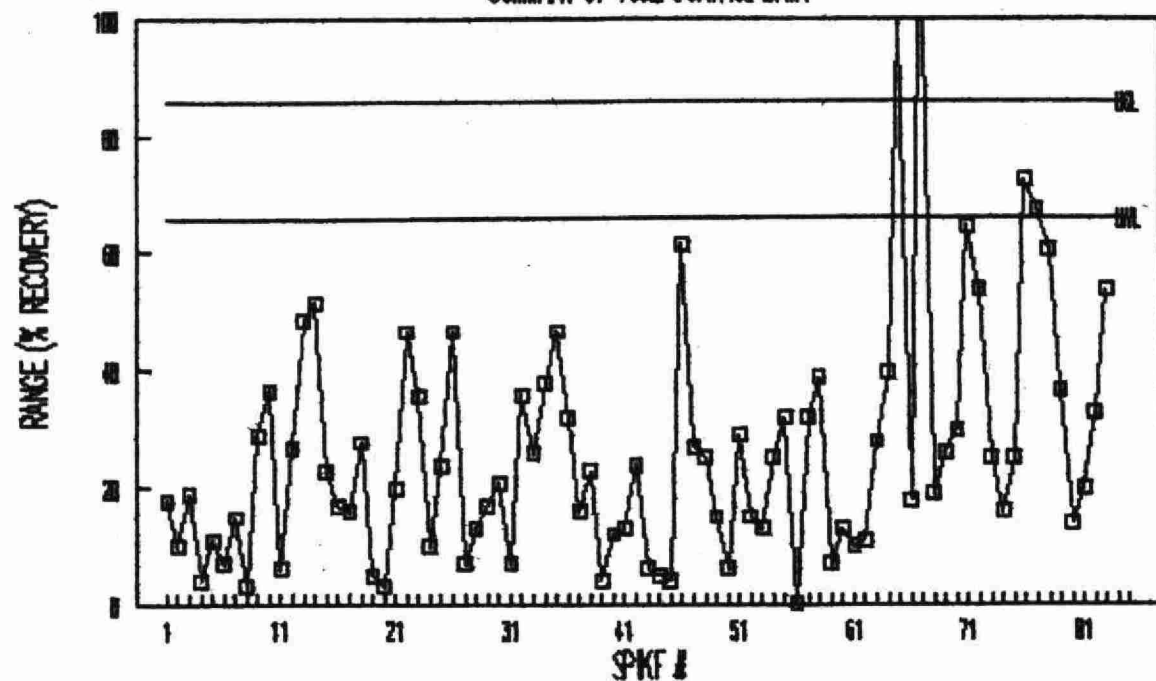
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SUMMARY OF 1992 CONTROL DATA



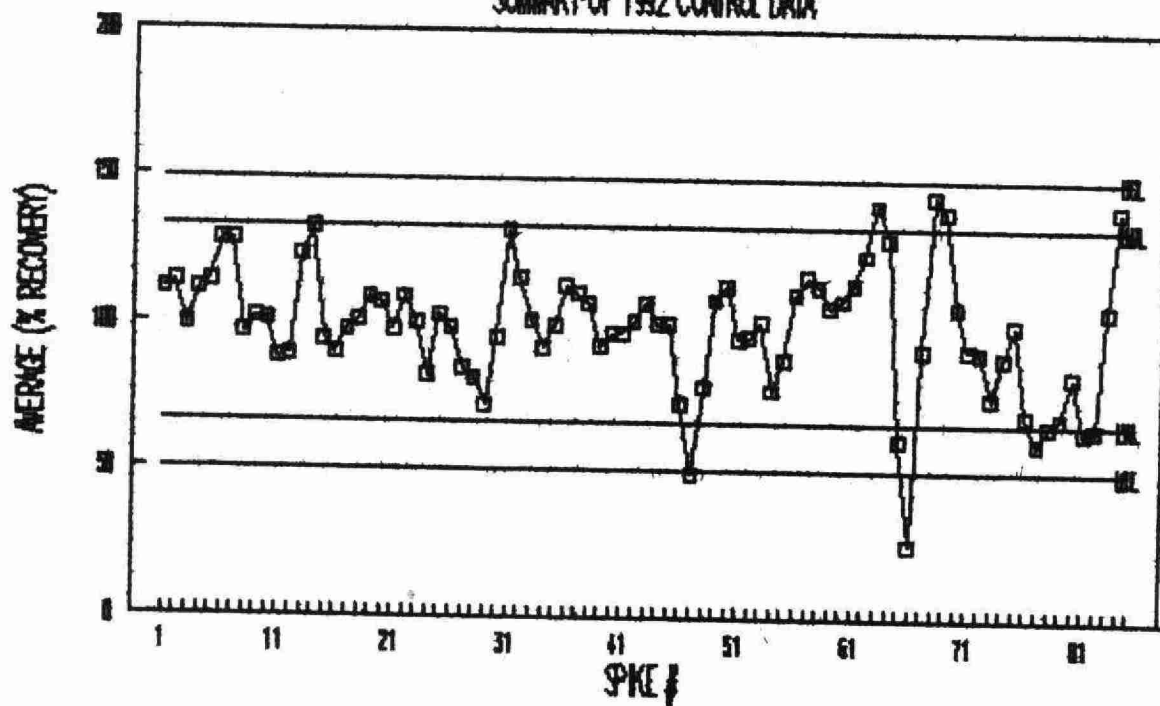
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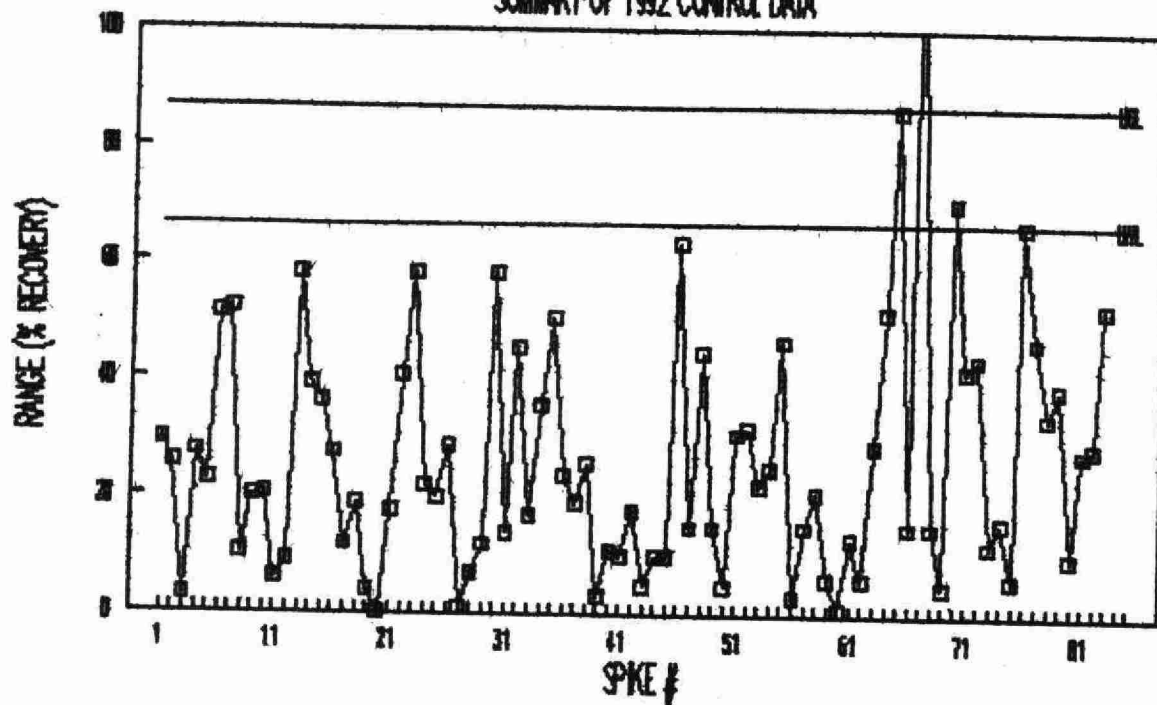
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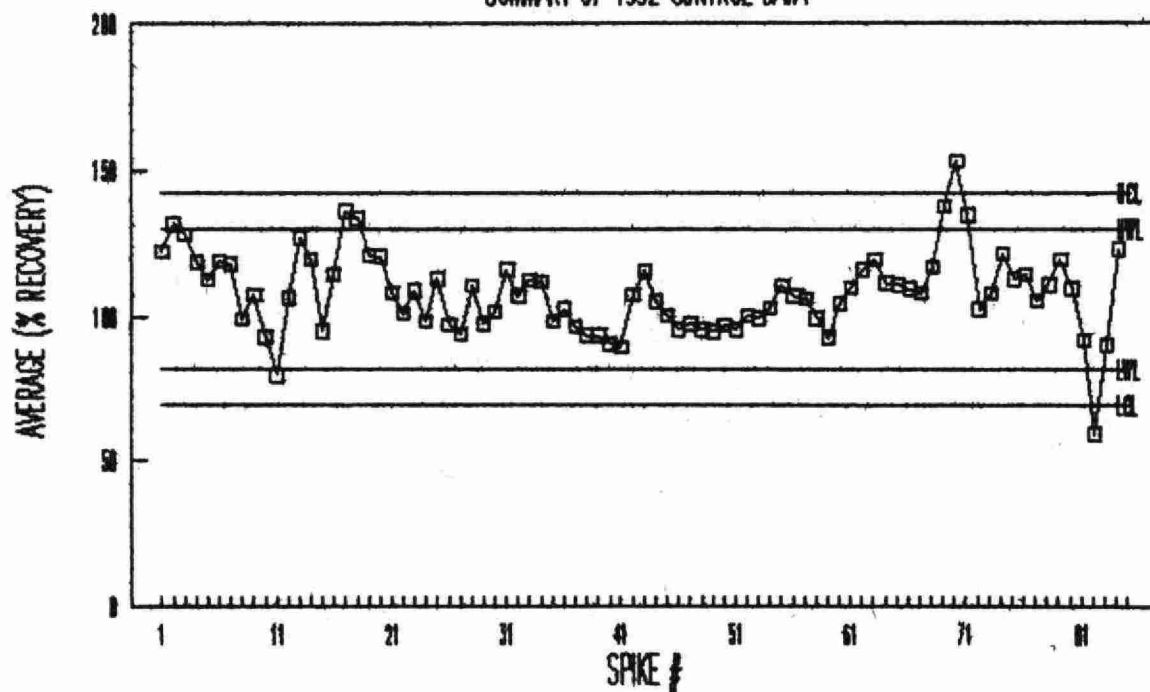
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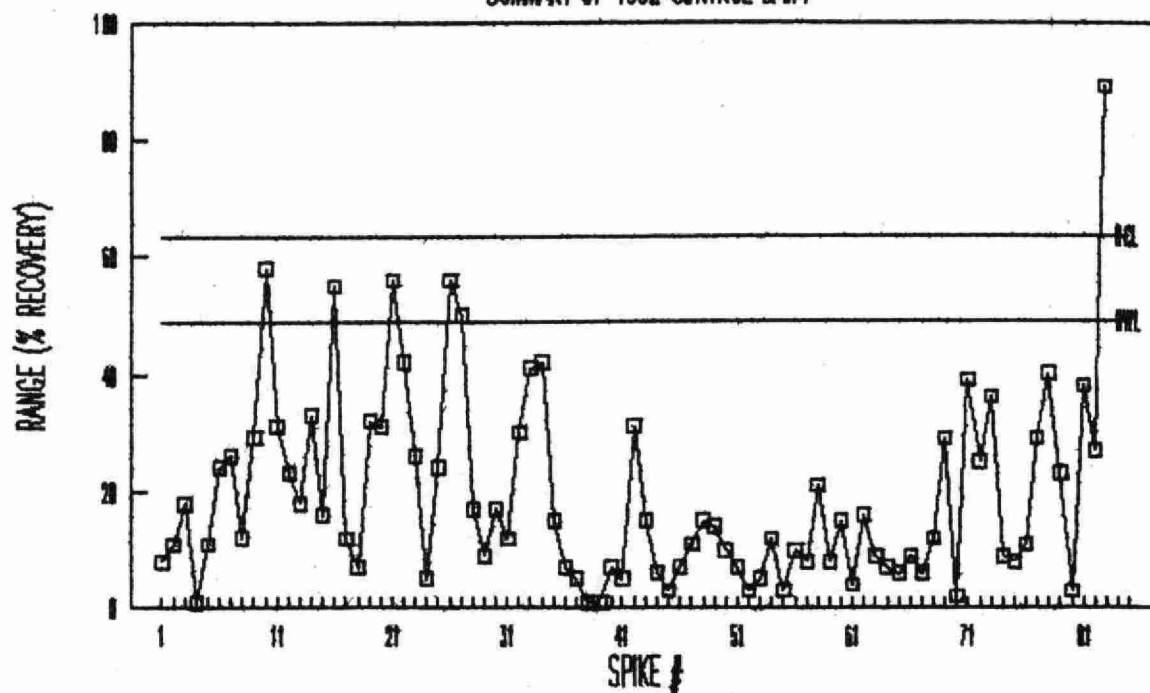
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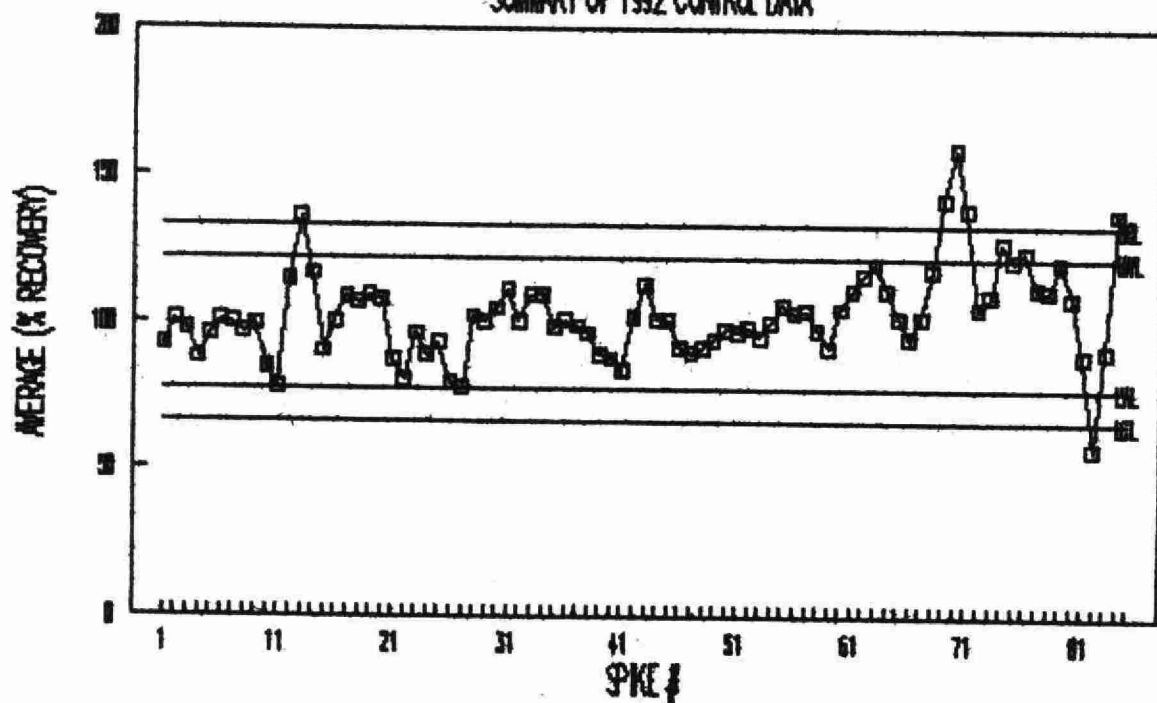
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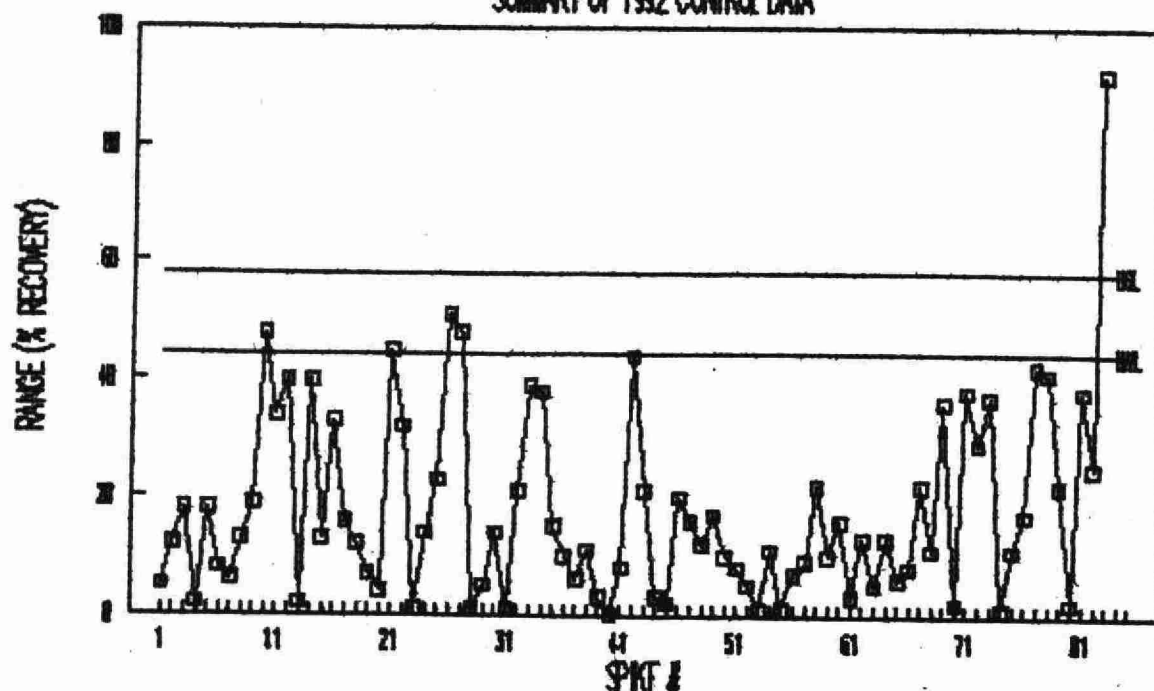
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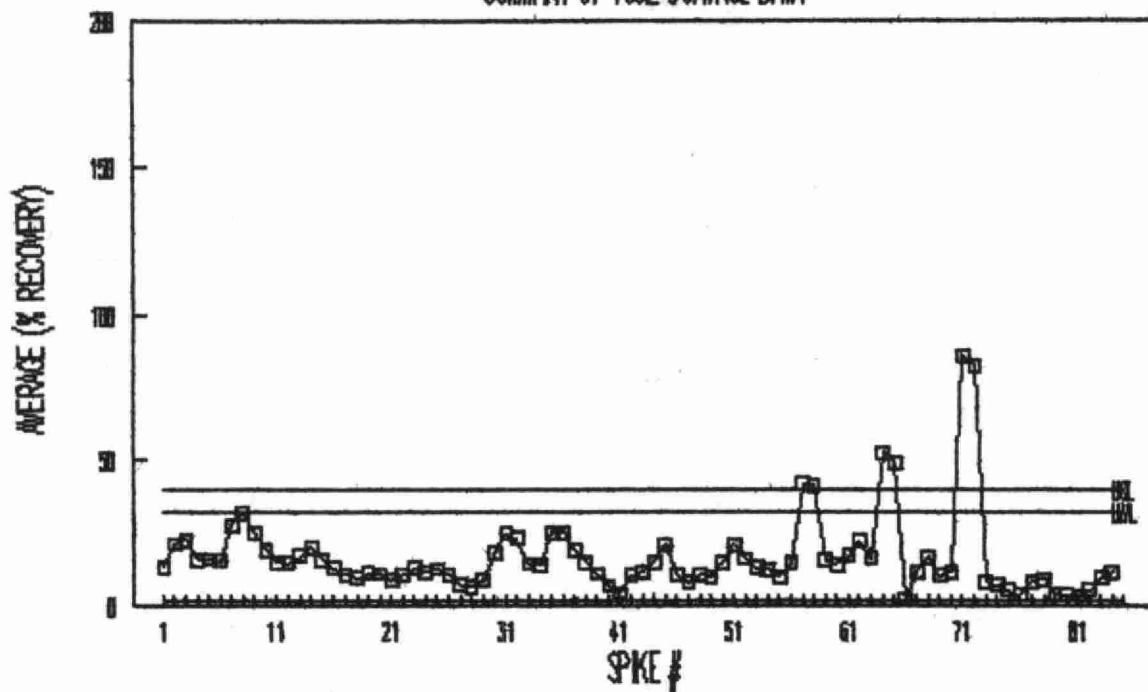
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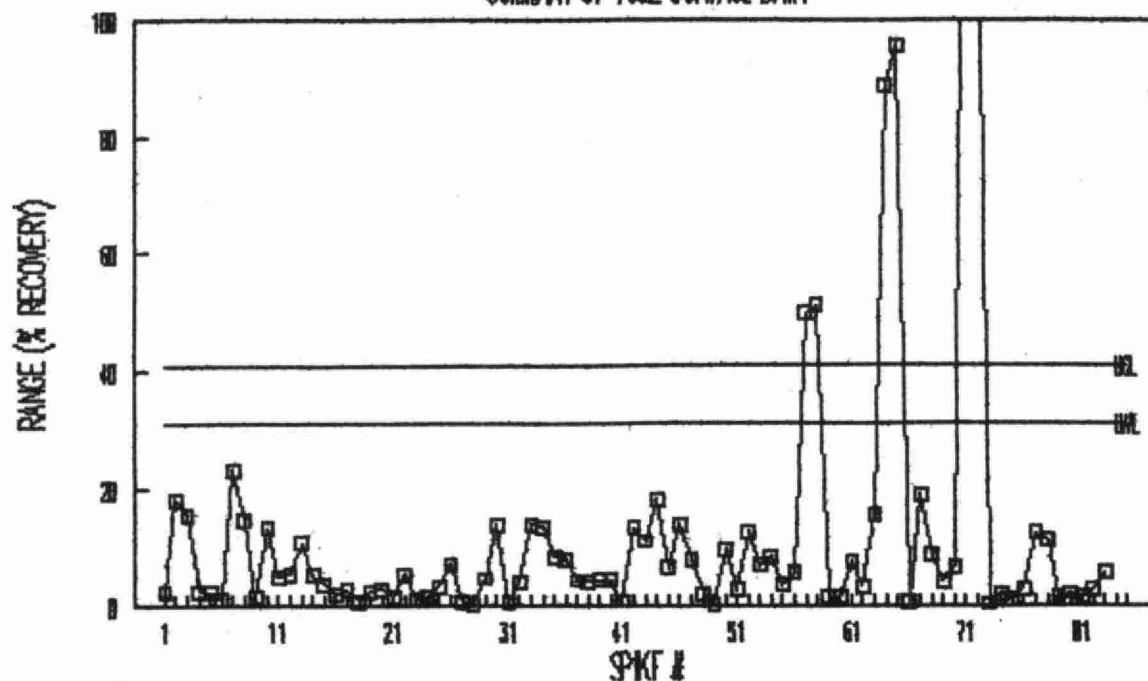
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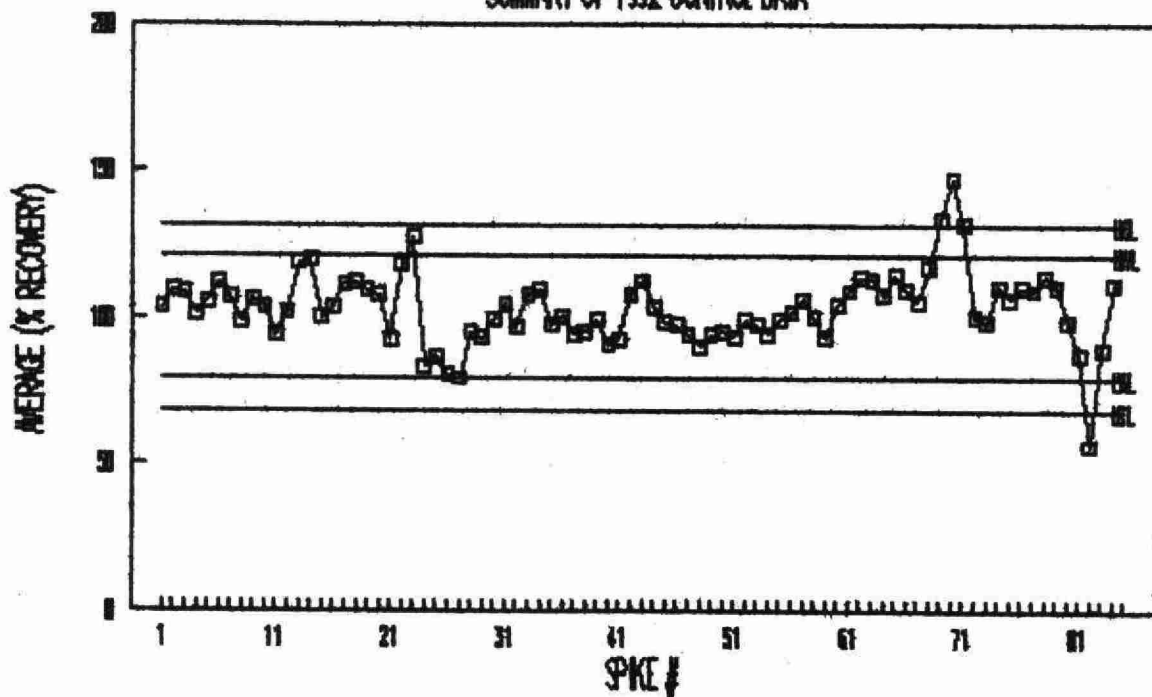
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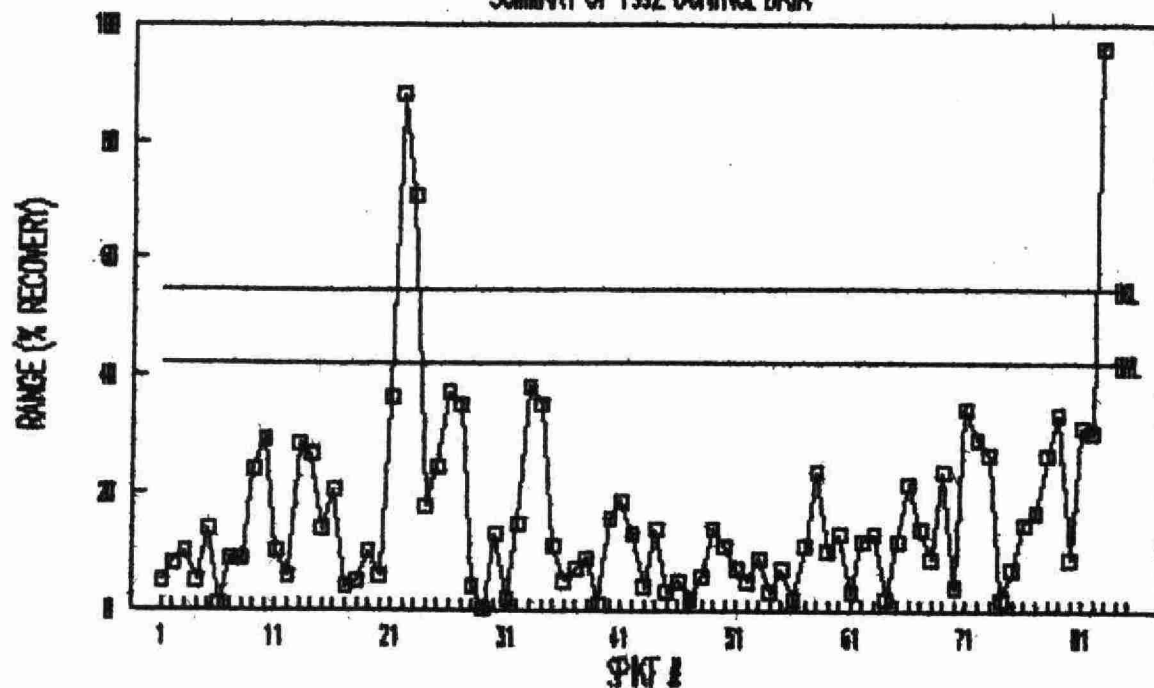
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SUMMARY OF 1992 CONTROL DATA



MISA19/20:PNGHIP

SUMMARY OF 1992 CONTROL DATA





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TD/380/T72/P47/1992/MOE

Date Due

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